

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In re Application of:	Jeffrey Jovan Philyaw	
Application Serial No.:	09/659,170	Confirmation No.: 6265
Filing Date:	September 11, 2000	
Group:	3625	
Examiner:	Mark A. Fadok	
Title:	ACCESSING A VENDOR WEB SITE USING PERSONAL ACCOUNT INFORMATION RETRIEVED FROM A CREDIT CARD COMPANY WEB SITE	

BRIEF ON APPEAL

Gregory M. Howison
HOWISON & ARNOTT, L.L.P.
Attorneys for Appellants
P.O. Box 741715
Dallas, Texas 75374-1715
Phone: (972) 680-6050
Facsimile: (972)-479-0462
e-mail: patents@dalpat.com

TABLE OF CONTENTS

I.	Real Party Interest.....	1
II.	Related Appeals and Interferences.....	1
III.	Status of the Claims.	3
IV.	Status of Amendments.	3
V.	Summary of the Claimed Subject Matter.....	3
VI.	Grounds of Rejection to be Reviewed on Appeal.....	14
VII.	Argument and Discussion.	15
A.	Rejections under 35 U.S.C. §103.....	15
B.	Recent Decisions Affecting a Finding of Obviousness.	16
1.	In re <i>Kahn</i>	16
2.	KSR.....	22
C.	35 U.S.C § 103 Rejection in the Application on Appeal.....	24
1.	Independent Claim 1 as rejected by the combination of <i>Rhoads, Kramer and Morrison</i> . 31	
2.	The Cited References – Analogous Art Test.	32
3.	Conclusion – Analogous Art Test.....	37
4.	The Cited References – Teaching/Suggestion/Motivation Test.	39
5.	Conclusion – TSM Test.	53
6.	KSR Test:	57
D.	Dependent Claims 2-5 and 7-10 as rejected by the combination of <i>Rhoads, Kramer and Morrison</i>	58
E.	Independent Claim 11 as rejected by the combination of <i>Rhoads, Kramer and Morrison</i> . 58	
F.	Dependent Claims 12-15 and 17-20 as rejected by the combination of <i>Rhoads, Kramer and Morrison</i>	59
G.	Dependent Claims 6 and 16 as rejected by the combination of <i>Rhoads, Kramer, Morrison and Official Notice</i>	59
H.	Independent Claim 21 as rejected by the combination of <i>Rhoads, Kramer and Morrison</i>	60
I.	Dependent Claims 22-30 as rejected by the combination of <i>Rhoads, Kramer and Morrison</i>	63
J.	Independent Claim 31 as rejected by the combination of <i>Rhoads, Kramer and Morrison</i> . 63	
K.	Dependent Claims 32-40 as rejected by the combination of <i>Rhoads, Kramer and Morrison</i>	64
VIII.	Conclusion	65

Appendices:

- A. U.S. Patent No. 6,311,214
- B. U.S. Patent No. 6,327,574
- C. Non Patent Literature (NPL see 892) to Morrison
- D. Alza Corporation v. Mylan Laboratories, Inc., 464 F.3d 1286 (Fed. Cir. 2006)
- E. *Anderson's-Black Rock, Inc. v. Pavement Salvage Co.*, 396 U.S. 57 (1969)
- F. *Cable Elec. Prods., Inc. v. Genmark, Inc.*, 770 F.2d 1031 (Fed. Cir. 1985)
- G. *Cross Medical Products, Inc. v. Metronics Sofamore Danek, Inc.*, 424 F.3d 1293, 1323 (Fed. Cir. 2005)
- H. *Dann v. Johnston*, 425 U.S. at 219, 226, 96 S.Ct. 1393, 47 L.Ed 2d 692 (1976)
- I. *In re Bond*, 910 F.2d, 831, (Fed. Cir. 1990)
- J. *In re Clinton*, 527 F.2d 1226 (C.C.P.A. 1976)
- K. *In re Dembiczak*, 175 F.3d 994, 998 (Fed. Cir. 1999)
- L. *In re Hiraro*, 535 F.2d, 67, (C.C.P.A. 1966)
- M. *In re Kahn*, 441 F.3d 977, 985 (Fed. Cir. 2006)
- N. *In re Regel*, 526 F.2d, 1399 (C.C.P.A. 1975)
- O. *In re Rouffett*, 149 F.3d 1350, 1357
- P. *KSR International Co. v. Teleflex Inc., et al.*, 127 S. Ct. 1727 (2007)
- Q. *Medichem S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1165 (Fed. Cir 2006)
- R. *Sakraida v. AGPro, Inc.*, 425 U.S. 273 (1976)
- S. *United States v. Adams*, 383 U.S. 39, 40 (1966)

TABLE OF AUTHORITIES

Cases

<i>Alza Corporation v. Mylan Laboratories, Inc.</i> , 464 F.3d 1286 (Fed. Cir. 2006).....	20, 22
<i>Anderson's-Black Rock, Inc. v. Pavement Salvage Co.</i> , 396 U.S. 57 (1969)	23
<i>Cable Elec. Prods., Inc. v. Genmark, Inc.</i> , 770 F.2d 1031 (Fed. Cir. 1985)	19
<i>Cross Medical Products, Inc. v. Metronics Sofamore Danek, Inc.</i> , 424 F.3d 1293, 1323 (Fed. Cir. 2005)	20
<i>Dann v. Johnston</i> , 425 U.S. at 219, 226, 96 S.Ct. 1393, 47 L.Ed 2d 692 (1976)	18
<i>In re Bond</i> , 910 F.2d, 831, (Fed. Cir. 1990)	19
<i>In re Clinton</i> , 527 F.2d 1226 (C.C.P.A. 1976).....	19
<i>In re Dembiczak</i> , 175 F.3d 994, 998 (Fed. Cir. 1999)	17
<i>In re Hiraro</i> , 535 F.2d, 67, (C.C.P.A. 1966)	19
<i>In re Kahn</i> , 441 F.3d 977, 985 (Fed. Cir. 2006)	16, 17, 18, 19, 20, 49
<i>In re Regel</i> , 526 F.2d, 1399 (C.C.P.A. 1975)	19
<i>In re Rouffett</i> , 149 F.3d 1350, 1357	17
<i>KSR International Co. v. Teleflex Inc, et al.</i> , 127 S. Ct. 1727 (2007)	19, 20, 23, 24, 57
<i>Medichem S.A. v. Rolabo, S.L.</i> , 437 F.3d 1157, 1165 (Fed. Cir 2006).....	20
<i>Sakraida v. AGPro, Inc.</i> , 425 U.S. 273 (1976)	23
<i>United States v. Adams</i> , 383 U.S. 39, 40 (1966).....	23

Rules

MPEP § 2142	19
MPEP § 2143.01	19

Regulations

35 United States Code § 103(a)	20
--------------------------------------	----

- U.S. Patent Application Serial No. 09/494,924 entitled “INPUT DEVICE FOR ALLOWING INTERFACE TO A WEB SITE IN ASSOCIATION WITH A UNIQUE INPUT CODE” (Atty. Dkt. No. PHL-24,913), filed on February 1, 2000;
- U.S. Patent Application Serial No. 09/382,374 entitled “METHOD AND APPARATUS FOR ALLOWING A BROADCAST TO REMOTELY CONTROL A COMPUTER” (Atty. Dkt. No. PHL-24,736), filed on August 24, 1999;
- U.S. Patent Application Serial No. 09/417,863 entitled “SOFTWARE DOWNLOADING USING A TELEVISION BROADCAST CHANNEL” (Atty. Dkt. No. PHL-24,767), filed on October 23, 1999;
- U.S. Patent Application Serial No. 09/602,034 entitled “CONTROLLING A PC USING A TONE FROM A CELLULAR TELEPHONE” (Atty. Dkt. No. PHL-25,337), filed on June 23, 2000; and
- U.S. Patent Application Serial No. 09/659,520 entitled “LAUNCHING A WEB SITE USING A PERSONAL DEVICE” (Atty. Dkt. No. PHL-25,355), filed on September 12, 2000.

Appellants have filed Notices of Appeal in the following related applications:

- U.S. Patent Application Serial No. 09/382,423 entitled “METHOD AND APPARATUS FOR UTILIZING AN AUDIBLE SIGNAL TO INDUCE A USER TO SELECT AN E-COMMERCE FUNCTION” (Atty. Dkt. No. PHL-24,739), filed on August 24, 1999;
- U.S. Patent Application Serial No. 09/642,891 entitled “RETRIEVING PERSONAL ACCOUNT INFORMATION FROM A WEB SITE BY READING A CREDIT CARD” (Atty. Dkt. No. PHL-25,338), filed on August 21, 2000; and

- U.S. Patent Application Serial No. 09/382,426 entitled “METHOD AND APPARATUS FOR LINKING A WEB BROWSER TO A PROMOTIONAL OFFER” (Atty. Dkt. No. PHL-24,732), filed on August 24, 1999.

The above-identified patent application has no related interferences.

III. Status of the Claims.

Claims 1-40 from the application are pending, stand firmly rejected, and are on appeal here. A complete and current listing of Claims 1-40 are attached here in the **CLAIMS APPENDIX**.

IV. Status of Amendments.

Appellants filed an Amendment on July 17, 2006 in response to the Office Action, mailed January 23, 2006. This Amendment and Response to Office Action was the last Response amending claims.

V. Summary of the Claimed Subject Matter.

The present invention, as set forth currently in independent Claim 1, relates to a method of accessing a vendor web site disposed on a network at the vendor location thereon using personal account information of a user retrieved from a credit card company server disposed on the network at a credit card location thereon. The method comprises the steps of, at a user location disposed on the network¹, reading a machine-resolvable code (MRC)², on a credit card of the user, with a reading device³; where the credit card was issued by the credit card company.⁴ The method includes extracting coded information from the MRC⁵ and obtaining routing information associated with the coded information, which routing information corresponds to the personal account information of the user stored on the credit card company server disposed on

¹ See Specification Figure 27; Figure 34; page 57, lines 4-11; and page 80, line 27.

² See Specification Reference # 3402 on Figure 34; page 45, lines 11-15; page 45, lines 26-28; and page 56, lines 21-24.

³ See Specification Reference #1600 on Figures 27 and 34; page 46, lines 9-20; and page 48, lines 16-19.

⁴ See Specification page 45, lines 18-21; page 47, lines 11-15; page 56, lines 15-24; and page 84, lines 1-5.

⁵ See Specification page 46, lines 16-20; page 48, lines 5-19; page 54, lines 9-13; page 57, lines 4-6; page 61, lines 18-21; page 60, lines 2-4; and page 64, lines 20-22.

the network.⁶ Further, the method connects the user location to the credit card company server across the network in accordance with the routing information.⁷ Next, the method returns the personal account information from the credit card company server to the user location in response to the step of extracting⁸, which returned personal account information contains routing information relating to vendors that previously had been commercially related with the user.⁹ The method then presents the personal account information to the user at the user location.¹⁰ The next step is providing a hyperlink to a web site of a vendor in the personal account information for automatic connection of the user location to the vendor web site in response to the selection thereof by a user in a selection operation.¹¹ Thereafter, the method includes completing a financial transaction with the selected vendor in the selection operation to make a purchase, and utilizing the connection to the credit card server made in the step of connecting the user location to the credit card company to add purchases to the credit card account associated with the credit card of the user.¹²

The present invention, as set forth currently in dependent Claim 2, relates to the method of Claim 1, where the MRC is optical indicia.¹³

The present invention, as set forth currently in dependent Claim 3, relates to the method of Claim 2, where the optical indicia is a bar code.¹⁴

⁶ See Specification page 48, lines 24-27; page 50, lines 3-22; page 51, line 19-25; page 52, lines 4-11; page 57, lines 6-9; page 57, lines 12-16; page 59, lines 5-18; page 60, lines 2-10; page 60, lines 18-20; page 61, lines 20-26; page 64, lines 17-30.

⁷ See Specification Reference # 306 on Figure 27; and page 48, lines 10-23;

⁸ See Specification page 48, line 24 – page 49, line 12; page 57, lines 13-17; page 61, line 20 – page 62, line 3; page 62, lines 19-27; page 64, lines 22-25; page 65, lines 8-20; page 67, lines 6-8; page 70, lines 20-26; and page 73, lines 19-24.

⁹ See Specification page 47, line 17 – page 48, line 4; page 55, line 20 – page 56, line 1; page 65, lines 21-27; page 66, lines 3-26; page 67, line 26 – page 68, line 1; page 70, lines 17-19; page 71, lines 1-3; and page 81, lines 4-5.

¹⁰ See Specification page 49, lines 2-4; page 50, lines 15-17; page 56, lines 1-9; page 57, lines 15-17; page 61, lines 10-14; page 62 lines 3-11; page 64, lines 5-8; page 64, lines 25-26; page 66, lines 5-8; page 66, lines 26-28; page 68, line 1; page 70, lines 17-19; page 71, lines 1-8; page 72, lines 19-21; page 73, lines 13-18; and page 81, lines 5-9.

¹¹ See Specification page 56, lines 10-14; page 57, line 18 – page 58, line 19; page 66, lines 8-21; page 68, line 4 – page 69, line 3; page 72, line 22 – page 73, line 2; and page 81, lines 15-21.

¹² See Specification page 66, lines 15-26; page 73, lines 2-18; and page 81, line 21 – page 82, line 14.

¹³ See Specification Reference #2500 on Figure 25; page 45, lines 14-15; page 46, lines 16-20; and page 56, lines 19-24.

¹⁴ See Specification Reference #2500 on Figure 25; page 45, lines 14-15; page 46, lines 16-20; and page 56, lines 19-24.

The present invention, as set forth currently in dependent Claim 4, relates to the method of Claim 1, where the routing information in the step of obtaining is stored on a user computer at the user location such that the coded information in the step of extracting is used to obtain the corresponding routing information from the user computer.¹⁵

The present invention, as set forth currently in dependent Claim 5, relates to the method of Claim 4, where the user computer stores a plurality of coded information each associated with unique routing information such that reading of the MRC of a select one of one or more credit cards of the user causes the user computer to connect to the corresponding credit card company server over the network.¹⁶

The present invention, as set forth currently in dependent Claim 6, relates to the method of Claim 1, where the reading device is a wireless scanner which transmits the coded information to a user computer at the user location via a receiving device operatively connected to the user computer.¹⁷

The present invention, as set forth currently in dependent Claim 7, relates to the method of Claim 1, where personal account information in the step of presenting is displayed on a computer display operatively connected to a user computer at the user location.¹⁸

The present invention, as set forth currently in dependent Claim 8, relates to the method of Claim 1, where the routing information in the step of obtaining comprises a network address of the credit card company server on the network and file path information which locates the personal account information of the user on the credit card company server.¹⁹

The present invention, as set forth currently in dependent Claim 9, relates to the method of Claim 1, where the hyperlink is associated with a line item transaction of the personal account

¹⁵ See Specification page 64, line 17 – page 65, line 2.

¹⁶ See Specification page 62, lines 19-27; and page 63, lines 1-20.

¹⁷ See Specification Reference #3410 on Figure 34; page 60, lines 11-18; and page 77, line 9 – page 78, line 14

¹⁸ See Specification Reference #1612 on Figure 34; Reference #302 on Figure 34; and page 57, lines 15-17.

¹⁹ See Specification page 59, lines 19-27.

information such that the purchased product associated with the line item transaction is a select one of one or more products of the vendor of the web site which are available for purchase.²⁰

The present invention, as set forth currently in dependent Claim 10, relates to a method of Claim 1, where the hyperlink is associated with a line item transaction of the personal account information such that the purchased product associated with the line item transaction is unrelated to product information of one or more products of the vendor of the web site which are available for purchase and to which the hyperlink is associated.²¹

The present invention, as set forth currently in independent Claim 11, relates to a system for accessing a vendor web site on a network using personal credit card account information retrieved from a credit card company server disposed on a network. The system comprises the steps of a machine-resolvable code (MRC)²² on a credit card of a user issued to the user by the credit card company²³, wherein said MRC is read with a reading device at a user locating of said user²⁴, said user location disposed on the network²⁵, and coded information of said MRC extracted therefrom²⁶; routing information associated with said coded information, which said routing information corresponds to the personal account information of said user stored on the credit card company server;²⁷ where the user location is connected to the credit card company server across the network via a credit card company connection in response to the reading of the MRC in accordance with said routing information²⁸, and the personal account information returned from the credit card company server to said user location is presented to said user at said user location²⁹, which returned personal account information contains as a portion thereof routing information relating to vendors that previously had been commercially related with by the user;³⁰ a hyperlink to a web site of a vendor provided in association with the personal account

²⁰ See Specification page 57, line 18 – page 58, line 2.

²¹ See Specification page 58, lines 3-19

²² See Specification Reference #2500 on Figure 25; Reference #3402 on Figure 34.

²³ See Specification Reference #2504 on Figure 25; page 45, lines 18-24; page 46, lines 9-20; page 56, lines 15-26.

²⁴ See Specification Reference #2512 on Figure 25; Reference #1600 on Figures 25, 17 and 34; page 46, lines 3-20; page 47, lines 11-14; page 57, lines 4-6.

²⁵ See Specification Figure 27 and Figure 34.

²⁶ See Specification page 57, lines 6-9

²⁷ See Specification page 48, lines 20-23; page 57, lines 9-17.

²⁸ See Specification page 57, lines 9-13.

²⁹ See Specification page 57, lines 13-17.

³⁰ See Specification page 57, lines 13-20.

information for automatically connecting said user location to said web site in response to the selection thereof by the user³¹; and where a user can complete a financial transaction with the hyperlinked vendor to make a purchase and use the credit card company connection to the credit card server to add purchases to the credit card account associated with the credit card.³²

The present invention, as set forth currently in dependent Claim 12, relates to the system of Claim 11, where said MRC is optical indicia.³³

The present invention, as set forth currently in dependent Claim 13, relates to the system of Claim 12, where said optical indicia is a bar code.³⁴

The present invention, as set forth currently in dependent Claim 14, relates to the system of Claim 11, where said routing information is stored on a user computer at said user location such that said coded information is used to obtain the corresponding said routing information from said user computer.³⁵

The present invention, as set forth currently in dependent Claim 15, relates to the system of Claim 14, where said user computer stores a plurality of said coded information each associated with unique said routing information such that reading of said MRC of a select one of the one or more credit cards of said user causes said user computer to connect to the corresponding credit card company server over the network.³⁶

The present invention, as set forth currently in dependent Claim 16, relates to the system of Claim 11, where said reading device is a wireless scanner which transmits said coded

³¹ See Specification page 57, line 18 – page 58, line 2.

³² See Specification page 58, lines 2-19.

³³ See Specification Reference #2500 on Figure 25; page 45, lines 14-15; page 46, lines 16-20; and page 56, lines 19-24.

³⁴ See Specification Reference #2500 on Figure 25; page 45, lines 14-15; page 46, lines 16-20; and page 56, lines 19-24.

³⁵ See Specification page 64, line 17 – page 68, line 2.

³⁶ See Specification page 62, lines 19-27; and page 63, lines 1-20.

information to a user computer via a receiving device operatively connected to said user computer.³⁷

The present invention, as set forth currently in dependent Claim 17, relates to the system of Claim 11, where personal account information is displayed on a computer display operatively connected to a user computer at said user location.³⁸

The present invention, as set forth currently in dependent Claim 18, relates to the system of Claim 11 where said routing information comprises a network address of the credit card company server on the network and file path information which locates the personal account information of said user on the credit card company server.³⁹

The present invention, as set forth currently in dependent Claim 19, relates to the system of Claim 11, where said hyperlink is associated with a line item transaction of the personal account information such that said purchased product associated with said line item transaction is a product available for purchase from said vendor web site.⁴⁰

The present invention, as set forth currently in dependent Claim 20, relates to the system of Claim 11, where said hyperlink is associated with a line item transaction of the personal account information such that said purchased product associated with said line item transaction is unrelated to product information of one or more products of said vendor of the web site which are available for purchase and to which said hyperlink is associated.⁴¹

The present invention, as set forth currently in independent Claim 21, relates to a method for connecting to a remote provider location on a network from a user location thereon. The method comprises the steps of: inputting a unique commerce code⁴² at the user location⁴³, where the unique commerce code is associated with commercial transactions of the user of the unique

³⁷ See Specification Reference #3410 on Figure 34; Reference #3520 on Figure 44; page 60, lines 11-18; and page 77, line 9 – page 78, line 14.

³⁸ See Specification Reference #1612 on Figure 34; Reference #302 on Figure 34; and page 57, lines 15-17.

³⁹ See Specification page 59, lines 19-27.

⁴⁰ See Specification page 57, line 18 – page 58, line 2.

⁴¹ See Specification page 58, lines 2-19.

⁴² See Specification page 47, lines 11-17.

⁴³ See Specification page 48, lines 5-23; page 84, lines 1-14.

commerce code⁴⁴; in response to the step of inputting, displaying to the user correlating historical commercial transaction information associated with the unique commerce code, which displayed correlating historical commercial transaction information has associated therewith corresponding routing information over the network to other locations on the network, at least one of which is the remote commerce provider's location on the network⁴⁵; allowing the user the option of selecting the routing information to the remote commerce provider's location on the network⁴⁶; selecting by the user the routing information to the remote provider's location on the network⁴⁷; in response to the user selecting, connecting the user location to the remote commerce provider's location⁴⁸; and completing a financial transaction with the remote commerce provider's location to which the user is connected to make a purchase, and updating the historical commercial transaction information associated with the unique commerce code and adding commercial transactions thereto.⁴⁹

The present invention, as set forth currently in dependent Claim 22, relates to the method of Claim 21, wherein the step of displaying in response to the step of inputting comprises the steps of: connecting to a commerce transaction location on the network that is associated with the unique commerce code in the step of inputting⁵⁰; the commerce transaction location having associated therewith a relational database with a plurality of information blocks of commercial transaction information associated with at least a portion of each of a plurality of unique commerce codes⁵¹; and comparing the received at least a portion of the unique commerce code with the database and, if a match exists, returning the associated information block of commercial transaction information to the user.⁵²

⁴⁴ See Specification page 56, lines 4-14; page 65, lines 3-8; page 71, lines 24-27; page 72, lines 1-4; page 82, lines 15-25; and page 84, line 14 – page 85, line 10.

⁴⁵ See Specification page 57, lines 18-25; page 66, lines 3-28; page 85, lines 10-16; and page 81, lines 1-13.

⁴⁶ See Specification page 57, lines 18-25; page 66, lines 8-15; page 68, lines 7-9; page 69, lines 4-9; page 72, lines 22-24; page 81, lines 15-28; page 83, lines 1-8; page 85, lines 7-10.

⁴⁷ See Specification page 57, line 25 – page 58, line 2; page 66, lines 8-15; page 67, lines 9-11; page 72, lines 24-25; page 82, lines 1-5; and page 85, lines 7-10.

⁴⁸ See Specification page 58, lines 2-19; page 66, lines 11-17; page 67, lines 11-14; page 72, lines 25-27; page 73, lines 1-4; page 82, lines 1-5; and page 82, lines 24-27.

⁴⁹ See Specification page 66, line 17 – page 67, line 2; page 73, lines 8-18; and page 83, lines 11-29.

⁵⁰ See Specification page 82, lines 15-27.

⁵¹ See Specification page 69, line 20 – page 70, line 4; page 73, lines 19-28; page 72, lines 5-21; and page 82, lines 21-25.

⁵² See Specification page 82, lines 24-27.

The present invention, as set forth currently in dependent Claim 23, relating to the method of Claim 22, wherein the returned information block is unique to the at least a portion of the unique commerce code transmitted thereto.⁵³

The present invention, as set forth currently in dependent Claim 24, relates to the method of Claim 23, wherein the unique commerce code is comprised of a first portion that is associated with routing information to the commercial transaction location on the network⁵⁴ and a second portion that is related to the associated information block of commercial transaction information in the database⁵⁵, the second portion corresponding to the at least one portion.⁵⁶

The present invention, as set forth currently in dependent Claim 25, relates to the method of Claim 22, wherein the step of connecting comprises the steps of: routing at least a portion of the unique commerce code to an intermediate location on the network⁵⁷, the intermediate location containing a database with relational information between a plurality of the at least portion of the unique commerce codes to network addresses of commercial transaction locations on the network⁵⁸; comparing the received at least portion of the unique commerce code with information in the database⁵⁹; and, if a match exists, returning the routing information to the commercial transaction location on the network and connecting thereto.⁶⁰

The present invention, as set forth currently in dependent Claim 26, relates to the method of Claim 25, wherein the unique commerce code has a first portion that is stored in the database associated with the intermediate location on the network for determining the location of the commercial transaction location network⁶¹ and a second portion associated with the database⁶² at

⁵³ See Specification page 67, lines 24-27; page 72, lines 16-21; and page 83, lines 3-10.

⁵⁴ See Specification Reference #3802 on Figure 38.

⁵⁵ See Specification Reference #3800 on Figure 38.

⁵⁶ See Specification page 60, lines 2-4; page 60, lines 11-27; page 67, lines 17-27; page 70, lines 5-19; page 73, lines 20-26.

⁵⁷ See Specification page 60, lines 5-8; and page 71, lines 25-27.

⁵⁸ See Specification Reference #3802 on Figure 38; page 67, lines 17-20; page 73, lines 20-26; page 72, lines 2-4.

⁵⁹ See Specification page 67, lines 20-22; and page 72, lines 2-4.

⁶⁰ See Specification page 67, line 20 – page 68, line 1; and page 72, lines 5-27.

⁶¹ See Specification Reference #3802 on Figure 38.

⁶² See Specification Reference #3800 on Figure 38.

the commercial transaction location on the network for determining the information to be returned to the user.⁶³

The present invention, as set forth currently in dependent Claim 27, relates to the method of Claim 21, wherein the unique commerce code is disposed on a substrate and the step of inputting comprises reading the unique commerce code disposed on the substrate.⁶⁴

The present invention, as set forth currently in dependent Claim 28, relates to the method of Claim 27, wherein the step of reading the unique commerce code comprises using a bar code reader.⁶⁵

The present invention, as set forth currently in dependent Claim 29, relates to the method of Claim 27, wherein the substrate comprises a credit card.⁶⁶

The present invention, as set forth currently in independent Claim 30, relates to the method of Claim 29, wherein the credit card, in addition to having the unique commerce code associated therewith, has additional identification information for the purposes of utilizing the credit card in a commercial transaction outside of the step of inputting.⁶⁷

The present invention, as set forth currently in independent Claim 31, relates to a method for connecting to a remote provider location on a network from a user location thereon for the purpose of completing a transaction therewith, comprising the steps of: ⁶⁸ at the user location⁶⁹, wherein the unique commerce code is uniquely associated with commercial transactions of a unique user of the unique commerce code⁷⁰, and which unique commerce code is issued to the

⁶³ See Specification Reference #3602 on Figure 38; page 60, lines 2-4; page 60, lines 11-28; page 67, lines 17-27; and page 73, lines 20-26.

⁶⁴ See Specification page 46, lines 9-20; page 48, lines 16-17; page 56, lines 8-9; and page 56, lines 21-24.

⁶⁵ See Specification Reference #1600 on Figures 25, 27, 33 and 34; page 31, lines 4-6; page 57, lines 4-6; and page 60, lines 11-14.

⁶⁶ See Specification page 46, lines 9-20; page 48, lines 16-17; page 56, lines 8-9; and page 56, lines 21-24.

⁶⁷ See Specification page 56, lines 24-26.

⁶⁸ See Specification page 47, lines 11-17.

⁶⁹ See Specification page 48, lines 5-23; page 84, lines 1-14.

⁷⁰ See Specification page 56, lines 4-14; page 65, lines 3-8; page 71, lines 24-27; page 72, lines 1-4; page 82, lines 15-25; and page 84, line 14 – page 85, line 10.

user by financial entity that monitors financial transactions of users⁷¹; in response to the step of inputting, displaying to the user correlating historical commercial transaction information associated with the unique commerce code by the financial entity, which displayed correlating historical commercial transaction information has associated therewith corresponding routing information over the network to other locations on the network, at least one of which is the remote commerce provider's location on the network⁷²; allowing the user the option of selecting the routing information to the remote commerce provider's location on the network⁷³; selecting by the user the routing information to the remote provider's location on the network⁷⁴; in response to the user selecting, connecting the user location to the remote commerce provider's location⁷⁵; and completing a financial transaction with the remote commerce provider's location to which the user is connected to make a purchase, and updating the historical commercial transaction information associated with the unique commerce code by the financial entity and adding commercial transactions thereto.⁷⁶

The present invention, as set forth currently in dependent Claim 32, relates to the method of Claim 31, wherein the step of displaying in response to the step of inputting comprises the steps of: connecting to a commerce transaction location associated with the financial entity and controlled thereby on the network that is associated with the unique commerce code in the step of inputting⁷⁷; the commerce transaction location having associated therewith a relational database with a plurality of information blocks of commercial transaction information associated with at least a portion of each of a plurality of unique commerce codes⁷⁸; and comparing the

⁷¹ See Specification page 45, line 26 – page 46, line 20; page 47, lines 3-16; page 56, line 15 – page 57, line 3; and 73, lines 19-27.

⁷² See Specification page 57, lines 18-25; page 66, lines 3-28; page 85, lines 10-16; and page 81, lines 1-13.

⁷³ See Specification page 57, lines 18-25; page 66, lines 8-15; page 68, lines 7-9; page 69, lines 4-9; page 72, lines 22-24; page 81, lines 15-28; page 83, lines 1-8; page 85, lines 7-10.

⁷⁴ See Specification page 57, line 25 – page 58, line 2; page 66, lines 8-15; page 67, lines 9-11; page 72, lines 24-25; page 82, lines 1-5; and page 85, lines 7-10.

⁷⁵ See Specification page 58, lines 2-19; page 66, lines 11-17; page 67, lines 11-14; page 72, lines 25-27; page 73, lines 1-4; page 82, lines 1-5; and page 82, lines 24-27.

⁷⁶ See Specification page 66, line 17 – page 67, line 2; page 73, lines 8-18; and page 83, lines 11-29.

⁷⁷ See Specification page 82, lines 15-27.

⁷⁸ See Specification page 69, line 20 – page 70, line 4; page 73, lines 19-28; page 72, lines 5-21; and page 82, lines 21-25.

received at least a portion of the unique commerce code with the database and, if a match exists, returning the associated information block of commercial transaction information to the user.⁷⁹

The present invention, as set forth currently in dependent Claim 33, relates to the method of Claim 32, wherein the returned information block is unique to the at least a portion of the unique commerce code transmitted thereto.⁸⁰

The present invention, as set forth currently in independent Claim 34, relates to the method of Claim 33, wherein the unique commerce code is comprised of a first portion that is associated with routing information to the commercial transaction location on the network⁸¹ and a second portion that is related to the associated information block of commercial transaction information in the database⁸², the second portion corresponding to the at least one portion.⁸³

The present invention, as set forth currently in independent Claim 35, relates to the method of Claim 32, wherein the step of connecting comprises the steps of: routing at least a portion of the unique commerce code to an intermediate location on the network⁸⁴ controlled by the financial entity⁸⁵, the intermediate location containing a database with relational information between a plurality of the at least portion of the unique commerce codes to network addresses of commercial transaction locations on the network⁸⁶; comparing the received at least portion of the unique commerce code with information in the database⁸⁷; and, if a match exists, returning the routing information to the commercial transaction location on the network and connecting thereto.⁸⁸

The present invention, as set forth currently in dependent Claim 36, relates to the method of Claim 35, wherein the unique commerce code has a first portion that is stored in the database

⁷⁹ See Specification page 82, lines 24-27.

⁸⁰ See Specification page 67, lines 24-27; page 72, lines 16-21; and page 83, lines 3-10.

⁸¹ See Specification Reference #3802 on Figure 38.

⁸² See Specification Reference #3800 on Figure 38.

⁸³ See Specification page 60, lines 2-4; page 60, lines 11-27; page 67, lines 17-27; page 70, lines 5-19; page 73, lines 20-26.

⁸⁴ See Specification page 60, lines 5-8; and page 71, lines 25-27.

⁸⁵ See Specification page 49, lines 13-20; page 50, lines 24-27; page 55, line 4 – page 56, line 3; page 57, lines 4-17; page 58, lines 3-8; page 59, lines 5-18; page 61, lines 1-17; and page 62, line 19 – page 63, line 20.

⁸⁶ See Specification Reference #3602 on Figure 38; page 67, lines 17-20; page 73, lines 20-26; page 72, lines 2-4.

⁸⁷ See Specification page 67, lines 20-22; and page 72, lines 2-4.

⁸⁸ See Specification page 67, line 20 – page 68, line 1; and page 72, lines 5-27.

associated with the intermediate location on the network for determining the location of the commercial transaction location network⁸⁹ and a second portion associated with the database⁹⁰ at the commercial transaction location on the network for determining the information to be returned to the user.⁹¹

The present invention, as set forth currently in dependent Claim 37, relates to the method of Claim 31, wherein the unique commerce code is disposed on a substrate and the step of inputting comprises reading the unique commerce code disposed on the substrate, which substrate is issued to the use by the financial entity.⁹²

The present invention, as set forth currently in dependent Claim 38, relates to the method of Claim 37, wherein the step of reading the unique commerce code comprises using a bar code reader.⁹³

The present invention, as set forth currently in dependent Claim 39, relates to the method of Claim 37, wherein the substrate comprises a credit card and wherein the financial entity comprises a credit card company.⁹⁴

The present invention, as set forth currently in independent Claim 40, relates to the method of Claim 39, wherein the credit card, in addition to having the unique commerce code associated therewith, has additional identification information for the purposes of utilizing the credit card in a commercial transaction outside of the step of inputting.⁹⁵

VI. Grounds of Rejection to be Reviewed on Appeal.

Claims 1-5, 7-15 and 17-40 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,311,214 to Rhoads ("*Rhoads*") in view of U.S. Patent No. 6,327,574 to Kramer et al ("*Kramer*") and further in view of Non Patent Literature to Morrison

⁸⁹ See Specification Reference #3802 on Figure 38.

⁹⁰ See Specification Reference #3800 on Figure 38.

⁹¹ See Specification Reference #3602 on Figure 38; page 60, lines 2-4; page 60, lines 11-28; page 67, lines 17-27; and page 73, lines 20-26.

⁹² See Specification page 46, lines 9-20; page 48, lines 16-17; page 56, lines 8-9; and page 56, lines 21-24

⁹³ See Specification Reference #1600 on Figures 25, 27, 33 and 34; page 31, lines 4-6; page 57, lines 4-6; and page 60, lines 11-14.

⁹⁴ See Specification page 46, lines 9-20; page 48, lines 16-17; page 56, lines 8-9; and page 56, lines 21-24.

⁹⁵ See Specification page 56, lines 24-26

(“*Morrison*”). Claims 6 and 16 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Rhoads* in view of *Kramer*, further in view of *Morrison*, and further in view of an *Official Notice*.

As detailed below, Appellants believe that the Examiner has improperly applied the combination of the *Rhoads*, *Kramer* and *Morrison* references to claims 1-5, 7-15, and 17-40 and the combination of *Rhoads*, *Kramer* and *Morrison* references with an *Official Notice* to claims 6 and 16. Specifically, Applicant submit that the §103 rejections based on the combination of *Rhoads*, *Kramer* and *Morrison* and *Rhoads*, *Kramer*, *Morrison* and an *Official Notice* are not proper and are without basis, and that the Examiner has failed to state a *prima facie* case as to the combinations of *Rhoads*, *Kramer* and *Morrison* and *Rhoads*, *Kramer*, *Morrison* and an *Official Notice* constituting viable combinations of references under 35 U.S.C. § 103.

VII. Argument and Discussion.

In order to prevail, Appellant must show that Examiner has improperly combined *Rhoads*, *Kramer* and *Morrison*, and *Rhoads*, *Kramer*, *Morrison* and an *Official Notice* in support of the 35 U.S.C. § 103. As such, a brief discussion of the relevant rules and recent court decisions affecting a proper rejection under 35 U.S.C. § 103 follows.

A. Rejections under 35 U.S.C. §103

MPEP § 2142 specifies that:

The examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. If the examiner does not produce a *prima facie* case, the applicant is under no obligation to submit evidence of nonobviousness.

In regard to what an examiner must show in order to establish a *prima facie* case of obviousness, MPEP § 2142 further explains that:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. . . . Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

In regard to what an examiner must do in order to meet the first criterion for a *prima facie* rejection, MPEP § 2143.01 specifies that:

Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art.

In the present application, the various combinations of references proposed by the Examiner are not supported by a proper suggestion or motivation to make each proposed modification. This means that the first criterion for a *prima facie* rejection has not been met, which in turn means the Examiner has failed to carry the burden of establishing a *prima facie* rejection. In addition, certain claim limitations are not taught or suggested by the cited combinations, which means that the third criterion for a *prima facie* rejection has not been met, and that the Examiner has further failed to carry the burden of establishing a *prima facie* rejection for this independent reason. Further, the Examiner has failed to put forth any arguments and has not provided any articulated reasoning as to how any deficiency (missing element) could be solved in a predictable manner through combination with any other reference.

B. Recent Decisions Affecting a Finding of Obviousness.

1. In re Kahn.

With respect to obviousness, a claimed invention is unpatentable if the differences between it and the prior art are “such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art.”⁹⁶ Obviousness is a question of law, based upon underlying factual questions which are reviewed for clear error following a bench trial. These “underlying factual inquiries include: (1) The scope and content of the prior art; (2) The level of ordinary skill in the prior art; (3) The difference between the claimed invention and the prior art; and (4) Objective evidence of nonobviousness.”⁹⁷

⁹⁶ 35 U.S.C. § 103(a) (2000); *In re Kahn*, 441 F.3d 977, 985 (Fed. Cir. 2006) (citing *Graham v. John Deere Co.*, 383 U.S.1, 13-14, 86 S.Ct. 684, 15L, Ed. 2d 545, 1962)

⁹⁷ *In re Dembiczak*, 175 F.3d 994, 998 (Fed. Cir. 1999).

In *Kahn* the Court noted that:

“ . . . to reject claims in an Application under § 103, an Examiner must show and unrebutted *prima facie* case of obviousness . . . on appeal to the board, an Applicant can overcome a rejection by showing insufficient evidence of a *prima facie* obviousness or by rebutting the *prima facie* case with evidence of secondary indicia of nonobviousness.”⁹⁸

When combining references, it is well recognized that “[m]ost inventions arise from a combination of old elements and each element may often be found in the prior art.”⁹⁹ “However, mere identification in the prior art of each element is insufficient to defeat the patentability of the combined subject matter as a whole.”¹⁰⁰ *Kahn* further states:

Rather, to establish a *prima facie* case of obviousness based on a combination of elements disclosed in the prior art, the Board must articulate the basis on which it concludes that it would have been obvious to make the claimed invention. *Id.* In practice, this requires that the Board “explain the reasons one of the ordinary skill in the art would have been motivated to select the references and to combine them to render the claimed invention obvious.” *Id. at 1357-59.* This entails consideration of both the “scope and content of the prior art” and the “level of ordinary skill in the pertinent art” aspects of the Graham test.¹⁰¹

The primary test that has been put forth by the Federal Circuit is the teaching-suggestion-motivation test. *Kahn* set forth that, when there is no explanation provided by the Board to explain the motivation, or the suggestion or the teaching, that would have led a skilled artisan at the time of the invention to the claimed combination as a whole, then the court would infer that hindsight was utilized to conclude that the invention was obvious. *Kahn* relied upon the *Rouffett* case for this teaching at 1358. The “teaching-suggestion-motivation” requirement was set forth to protect against the entry of hindsight into the obviousness analysis, a problem which §103 was meant to confront. Thus, in order to establish a *prima facie* case, some explanation as to teaching, suggestion, or motivation of each of the references and how they can be combined is required.

⁹⁸ *Kahn*, 441 F.3d at 985

⁹⁹ *In re Rouffett*, 149 F.3d 1350, 1357

¹⁰⁰ *Kahn*, 441 F.3d at 986, citing *Rouffett*, 149 F.3d at 1355, 1357

¹⁰¹ *Id.*

Although *Kahn* sets forth the teaching-suggestion-motivation test, there is still the “analogous-art” test that must be applied, this being one test that was articulated by the Supreme Court as part of the *Graham* analysis.¹⁰² “The analogous-art test requires that the Board show a reference is either in the field of the Applicant’s endeavor or is reasonably pertinent as to the problem with which the inventor was concerned in order to rely on that reference as a basis for rejection.”¹⁰³ The following was further stated by *Kahn*:

References are selected as being reasonably pertinent to the problem based on the judgment of a person having ordinary skill in the art. *Id.* (“It is necessary to consider the reality of the circumstances, in other words, common sense--in deciding in which fields a person of ordinary skill would reasonably be expected to look for a solution to the problem facing the inventor.” (quoting *In re Wood*, 599 F.2d 1032, 1036 (C.C.P.A. 1979))). We have explained that this test begins the inquiry into whether a skilled artisan would have been motivated to combine references by defining the prior art relevant for the obviousness determination, and that it is meant to defend against hindsight. See *id.*; *In re Clay*, 996 F.2d 656, 659-60 (Fed. Cir. 1992).¹⁰⁴

As such, the first step of analyzing the combination provided by the Examiner is to examine the references and determine if the combination satisfies the analogous-art test. The next step for determining obviousness is to analyze the teaching-suggestion-motivation test which:

... picks up where the analogous art test leaves off and informs the *Graham* analysis. To reach a non-hindsight driven conclusion as to whether a person having ordinary skill in the art at the time of the invention would have viewed the subject matter as a whole to have been obvious in view of multiple references, the Board must provide some rationale, articulation, [**23] or reasoned basis to explain why the conclusion of obviousness is correct. The requirement of such an explanation is consistent with governing obviousness law, see § 103(a); *Graham*, 383 U.S. at 35; *Dann*, 425 U.S. at 227-29, and helps ensure predictable patentability determinations.¹⁰⁵

¹⁰² See *Dann v. Johnston*, 425 U.S. at 219, 226, 96 S.Ct. 1393, 47 L.Ed 2d 692 (1976).

¹⁰³ *Kahn*, 441 F.3d at 987.

¹⁰⁴ *Kahn*, 441 F.3d at 987

¹⁰⁵ *Id.*

Even if all of the elements of a claim are disclosed in various prior art references, the long-standing rule that a claimed invention, as a whole¹⁰⁶, cannot be said to be obvious unless there is some reason or motivation given in prior art why someone would have been prompted to combine the teachings or the references.¹⁰⁷ The prior art itself may suggest desirability of a combination, or the motivation may come from other sources (for example, economic factors).¹⁰⁸ Thus, the motivation to combine the relevant art or teachings does not have to be found explicitly in the prior art but, rather, can be implicit thereto. “However, rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.”¹⁰⁹¹¹⁰ The purpose of such requirement is to ensure “due process and non-arbitrary decision making”, as it is in § 103.¹¹¹

Kahn articulated the considerations for motivation when analyzing obviousness. The Court stated “the problem examined is not the specific problem solved by the invention, but the general problem that confronted the inventor before the invention was made.”¹¹² In the reference in *Cross*, the quote that was cited by the Court¹¹³ was that “one of ordinary skill in the art need not see the identical problem addressed in the prior art reference to be motivated to apply its teachings.” As to motivation, the Courts upheld that the evidence of motivation to combine the prior art references “may flow from the prior art references themselves, knowledge of one of ordinary skill in the art, or, in some cases, from the nature of the problem to be solved.”¹¹⁴ *Kahn* summarized the motivation-suggestion-teaching test as follows:

Therefore, the “motivation-suggestion-teaching” test asks not merely what the references disclose, but whether a person of

¹⁰⁶ *In re Hiraro*, 535 F.2d, 67, (C.C.P.A. 1966).

¹⁰⁷ *In re Regel*, 526 F.2d, 1399 (C.C.P.A. 1975); *In re Bond*, 910 F.2d, 831, (Fed. Cir. 1990).

¹⁰⁸ See e.g. *In re Clinton*, 527 F.2d 1226 (C.C.P.A. 1976); *Cable Elec. Prods., Inc. v. Genmark, Inc.*, 770 F.2d 1031 (Fed. Cir. 1985).

¹⁰⁹ *Kahn*, 441 F.3d at 998 referring to *Lee*, 277, F.3d at 1343-46 and *Rouffett*, 149 F.3d at 1355-59.

¹¹⁰ It is noted that the Supreme Court in the recently decided case, *KSR International Co. v. Teleflex Inc.*, et al., 127 S. Ct. 1727 (2007) cited this specific language at page 1741 therein.

¹¹¹ *Kahn*, 441 F.3d at 998 referring to *Lee*, 277, F.3d at 1343-46 and *Rouffett*, 149 F.3d at 1355-59.

¹¹² *Id.* at 988, referring to *Cross Medical Products, Inc. v. Metronics Sofamore Danek, Inc.*, 424 F.3d 1293, 1323 (Fed. Cir. 2005).

¹¹³ *Cross*, 424 F.3d at 1323.

¹¹⁴ *Medichem S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1165 (Fed. Cir 2006), quoting *Brown and Williamson Tobacco Corp. v. Phillip Morris, Inc.*, 229 F.3d, 1120, 1125 (Fed. Cir. 2000).

ordinary skill in the art, possessed with the understandings and knowledge reflected in the prior art, and motivated by the general problem facing the inventor, would have been led to make the combination recited in the claims. See *Cross Med. Prods.*, 424 F.3d at 1321-24. From this it may be determined whether [**26] the overall disclosures, teachings, and suggestions of the prior art, and the level of skill in the art—i.e., the understandings and the knowledge of persons having ordinary skill in the art at the time of the invention—support the legal conclusions of obviousness. See *Princeton Biochemicals*, 411 F.3d at 1338 (pointing to evidence supplying detailed analysis of the prior art and the reasons one of ordinary skill would have possessed the knowledge and motivation to combine).¹¹⁵

In *Alza Corporation v. Mylan Laboratories, Inc.*, 464 F.3d 1286 (Fed. Cir. 2006), the Federal Circuit has responded to arguments made during pendency of the recently decided Supreme Court case, *KSR International Co v. Teleflex Inc., et al.*, 127 S. Ct. 1727 (2007) and has spelled out its law on obviousness, insisting that it is in harmony with Supreme Court precedent.

In the facts of this case, *Alza* sued Mylan for infringement of its patent (6,124,355) under 35 U.S.C. §271(c)(2) after Mylan sought FDA approval to market a generic version of oxybutynin, a drug used to treat urinary incontinence. The Federal Circuit affirmed the obviousness and non-infringement decisions of the district court.

In the process, Judge Arthur Gajarsa dedicated five pages of his opinion to then outline the Federal Circuit's law on obviousness, responding to many arguments made in the then pending Supreme Court case of *KSR Int'l Co. v. Teleflex, Inc.* (U.S. No. 04-1350). *KSR* and many amici, including the U.S. government, have challenged the Federal Circuit rule that proof of obviousness must include a showing of a "teaching, suggestion, or motivation" to combine the prior art elements of the claimed invention. *KSR* and others have said that this requirement is too rigid and is inconsistent with Supreme Court decisions issued since *Graham v. John Deere Co.*, 383 U.S. 1 (1966).

Judge Gajarsa wrote the following in his *Alza* opinion:

¹¹⁵ *Kahn*, 441 F.3d at 988.

This requirement has been developed consistent with the Supreme Court's obviousness jurisprudence as expressed in *Graham* and the text of the obviousness statute that directs us to conduct the obviousness inquiry "at the time the invention was made" 35 U.S.C. §103. As we explained in [*In re Kahn*, 441 F.3d 977 (Fed. Cir. 2006)],

The motivation-suggestion-teaching test picks up where the analogous art test leaves off and informs the *Graham* analysis. To reach a non-hindsight driven conclusion as to whether a person having ordinary skill in the art at the time of the invention would have viewed the subject matter as a whole to have been obvious in view of multiple references, the Board must provide some rationale, articulation, or reasoned basis to explain why the conclusion of obviousness is correct. The requirement of such an explanation is consistent with governing obviousness law . . .

441 F.3d at 987. We further explained that the "motivation to combine" requirement "[e]ntails consideration of both the 'scope and content of the prior art' and 'level of ordinary skill in the pertinent art' aspects of the *Graham* test." *Id.* at 986.

At its core, our anti-hindsight jurisprudence is a test that rests on the unremarkable premise that legal determinations of obviousness, as with such determinations generally, should be based on evidence rather than on mere speculation or conjecture. Our court's analysis in *Kahn* bears repeating:

A suggestion, teaching, or motivation to combine the relevant prior art teachings *does not have to be found explicitly in the prior art*, as "the teaching, motivation, or suggestion may be implicit from the prior art as a whole, rather than expressly stated in the references.... The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art." However, rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be *some* articulated reasoning with *some* rational underpinning to support the legal conclusion of obviousness. This requirement is as much rooted in the Administrative Procedure Act [for our review of Board determinations], which ensures due process and non-arbitrary decision making, as it is in § 103.

441 F.3d at 987-88 (quoting *In re Kotzab*, 217 F.3d 1365, 1370 (Fed. Cir. 2000)) (citations omitted) (emphases added). There is flexibility in our obviousness jurisprudence because a motivation may be found *implicitly* in the prior art. We do not have a rigid test that requires an actual teaching to combine before concluding that one of ordinary skill in the art would know to combine references. This approach, moreover, does not exist merely in theory but in practice, as well. Our recent decisions in *Kahn* and in [*Cross Med. Prods., Inc., v. Medtronic Sofamor Danek, Inc.*, 424 F.3d 1293 (Fed. Cir. 2005)] amply illustrate the current state of this court's views.¹¹⁶

2. KSR

The recently issued Supreme Court Case in *KSR* held that the Federal Circuit's Teaching, Suggestion or Motivation (TSM) test to combine known elements in order to show that the combination is obvious is too rigid. The Court reinforced their position that analysis under *Graham* has been reaffirmed. The Court indicated that its holding was that a "patent for a combination which only unites old elements with no change in their respective functions . . . obviously withdraws what is already known into the field of its monopoly and diminishes the resources available to skillful men."¹¹⁷ The Court stated that this was a "principal reason for declining to allow patents for what is obvious. The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results."¹¹⁸ The Court further went on to indicate that there were three cases that illustrated the application of this doctrine of predictability. The first case was *United States v. Adams*, 383 U.S. 39, 40 (1966). In discussing this case, the Court noted that it had "relied upon the corollary principal that when the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be non-obvious."¹¹⁹ In the second case, *Anderson's-Black Rock, Inc. v. Pavement Salvage Co.*, 396 U.S. 57 (1969), the Court reiterated "while the combination of old elements performed a useful function, it added nothing to the nature and quality of the radiant-heat burner already patented."¹²⁰ In the third case, *Sakraida v. AGPro, Inc.*, 425 U.S. 273 (1976), the Court stated that "when a patent 'simply arranges old

¹¹⁶ *Alza Corporation v. Mylan Laboratories, Inc.*, 464 F.3d 1286, 1290 (Fed. Cir. 2006).

¹¹⁷ *KSR*, 127 S. Ct. 1727, 1739 (2007), Citing *Great Atlantic & Pacific Co. v. Supermarket Equipment Corp.*, 340 U.S. 147, 152 (1950).

¹¹⁸ *Id.*

¹¹⁹ *Id.* at page 1740.

¹²⁰ *Id.*

elements with each performing the same function it had been known to perform’ and yields no more than one would expect from such an arrangement, the combination is obvious.”¹²¹

The Court summarized these three cases as follows:

The principles underlying these cases are instructive when the question is whether a patent claiming the combination of elements of prior art is obvious. When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. *If a person of ordinary skill can implement a predictable variation, §103 likely bars its patentability.* For the same reason, if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill. *Sakraida* and *Anderson’s-Black Rock* are illustrative—a court must ask whether the improvement is more than the predictable use of prior art elements according to their established functions.¹²² (Emphasis added.)¹²³

The Court recognized that following the above stated principals might involve more than “the simple substitution of one known element for another or the mere application of a known technique to a piece of prior art ready for the improvement.”¹²⁴ The Court noted that it might “be necessary for a Court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent that issued.”¹²⁵ However, the Court also noted that the analysis should be “made explicit” citing *Kahn* wherein it stated that “rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead there must be some articulated reason with some rational underpinning to support the legal conclusion of obviousness.”¹²⁶ The Court noted that, however, “the analysis need not seek out precise teachings directed to the specific subject

¹²¹ *Id.*, Citing *Sakraida* at 282.

¹²² *KSR*, 127 S. Ct. at page 1741.

¹²³ *Id.*

¹²⁴ *Id.*

¹²⁵ *Id.* at page 1741

¹²⁶ *Id.*

matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.”¹²⁷

Although the Court in this opinion rejected the rigidity of the TSM test, there was some reference to the decision in *Alza* wherein the Court noted the Federal Circuit’s position that “there is flexibility in our obviousness jurisprudence because the motivation may be found *implicitly* in the prior art. We do not have a rigid test that requires an actual teaching to combine . . . ,” citing *Alza*, 464 F.3d at 1291.¹²⁸ However, the Court also noted that the *Alza* decision was not before it and that, although they may describe an analysis more consistent with the Court’s earlier precedence, the Court of Appeals would have to consider the current decision in view of its future cases.

C. 35 U.S.C § 103 Rejection in the Application on Appeal.

Summary of Rejection:

Claims 1-5, 7-15 and 17-40 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Rhoads* in view of *Kramer* and further in view of *Morrison*.

Claims 6 and 16 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of *Rhoads*, *Kramer* and *Morrison* in further view of *Official Notice*.

Regarding Claims 1-5, 7-15 and 17-40, the Examiner stated as a summary of his rejection in the Final Office Action dated September 22, 2006:

Rhoads teaches accessing a website that is specified by the MRC encoded on a device such as a credit card (col 22, lines 40-45), and obtaining a credit card data (col 22, lines 25-40), but does not specifically mention that the returned personal account information contains routing information relating to vendors that previously had been commercially related with the user. Kramer teaches obtaining credit card data from a client machine that includes routing information relating to vendors that previously had been commercially related with the user (FIG 3B). It would have been obvious to a person having ordinary skill in the art at the

¹²⁷ *Id.*.

¹²⁸ *Id.* at page 1743.

time of the invention to include in Rhoads routing information relating to vendors that previously had been commercially related with the user because (*sic*) would provide a safe platform which to launch secure online purchasing and create a comfort level for the user, thus increasing usage and sales.

The Examiner further states:

The combination of Rhoads/Kramer teach (*sic*) accessing account information at a credit card company and using provided links to access vendors, but does not specifically mention that the a (*sic*) transaction is taking place with the connection to the credit card company. Morrison teaches a web site www.shopwithvisa.co.nz where online merchants are accessed to encourage secure transaction. It would have been obvious to a person having ordinary skill in the art at the time of the invention to include in Rhoads/Kramer conducting transaction from the credit card company web site, because this would provide greater security and increase the comfort level of people shopping on the internet, thus increasing revenue.

In regards to claim 2, Rhoads teaches wherein the MRC is optical indicia (col 26, lines 63-67).

In regards to claim 3, Rhoads teaches wherein the optical indicia is a bar code.

In regards to claim 4, Rhoads teaches wherein the routing information in the step of obtaining is stored on a user computer at the user location such that the coded information in the step of extracting is used to obtain the corresponding routing information from the user computer (col 8, lines 10-20 and col 16, lines 14-23).

In regards to claim 5, Rhoads teaches wherein the user computer stores a plurality of coded information each associated with unique routing information such that reading of the MRC of a select one of one or more credit cards of the user causes the user computer to connect to the corresponding credit card company server over the network (col 26, line 64 – col 27, line 14).

In regards to claim 6, (*sic*)¹²⁹ Rhoads teaches wherein personal account information in the step of presenting is displayed on a

¹²⁹ Appellants note that the Examiner, in each office action; mailed May 7, 2004 on page 6, mailed March 28, 2005 on page 6; mailed January 23, 2006 on page 6, and mailed September 22, 2006 on page 5, has listed this rejection in

computer display operative connected to a user computer at the user location (FIG 1).

In regards to claim 8 (*sic*) Rhoads teaches wherein the routing information in the step of obtaining comprises: a network address of the credit card company server on the network and file path information which locates the personal account information of the user on the credit card company server (col 26, line 65 – col 27, line 2).

In regard to claim 9 (*sic*) Rhoads teaches wherein the hyperlink is associated with a line item transaction of the personal account information such that the purchased product associated with the line item transaction is a select one of one or more products of the vendor of the web site which are available for purchase (col 27, lines 37-42, purchase information).

In regards to claim 10 (*sic*) Rhoads teaches wherein the hyperlink is associated with the line item transaction is unrelated to product information of one or more products of the vendor of the web site which are available for purchase and to which the hyperlink is associated (Kramer, FIG 3B).

In regards to claim 11 (*sic*) Rhoads discloses an (*sic*) accessing a vendor web site on a network using persona credit card account information retrieved from a credit card company server disposed on the network, comprising:

- a machine-resolvable code (MRC) on the credit card of a user, wherein said MRC is read with a reading device at a user location of said user, said user location disposed on the network, and coded information of said MRC extracted therefrom;

- routing information associated with said coded information, which said routing information corresponds to the personal account information of said user store on the credit card company server;

- wherein the user location is connected to the credit card company server across the network in accordance with said routing information, and the personal account information returned from the credit card company server to said user location is presented to said user at said user location which returned personal account information contains routing information relating to vendors that previously had been commercially related with by the user; and

- a hyperlink to a web site of a vendor provide in the personal account information for automatically connecting said user

reference to Claim 6. However, the limitations listed are found in Claim 7 of the instant application. As such, Appellants will address it as Claim 7.

location to said web site in response to the selection thereof (See response to claim 1).

In regards to claim 12, Rhoads teaches wherein said MRC is optical indicia (see response to claim 2).

In regards to claim 13, Rhoads teaches wherein said optical indicia is a bar code (see response to claim 3. *sic*)

In regards to claim 14, Rhoads teaches wherein said routing information is stored on a user computer at said user location such that said coded information is used to obtain the corresponding said routing information from said user computer (see response to claim 4).

In regards to claim 15, Rhoads teaches wherein said user computer stores a plurality of said coded information each associated with unique said routing information such that reading of said MRC of a select one of the one or more credit cards of said user causes said user computer to connect to the corresponding credit card company server over the network see response to claim 5).

In regards to claim 17, Rhoads teaches wherein personal account information is displayed on a computer display operatively connected to a user computer at said user location (see response to claim 7).

In regards to claim 18, Rhoads teaches wherein said routing information comprises a network address of the credit card company server on the network and file path information which locates the personal account information of said user on the credit card company server (see response to claim 8).

In regards to claim 19, Rhoads teaches wherein said hyperlink is associated with a line item transaction of the personal account information such that said purchased product associated with said line item transaction is a product available for purchase from said vendor web site (see response to claim 9).

In regards to claim 20, Rhoads teaches wherein said hyperlink is associated with a line item transaction of the personal account information such that said purchased product associated with said line item transaction is unrelated to product information of one or more products of said vendor of the web site which are available

for purchase and to which said hyperlink is associated (see response to claim 10).

In regards to claim 21, Rhoads discloses a method for connecting to a remote provider location on a network from a user location thereon comprising the steps of;

inputting a unique commerce code at the user location, wherein the unique commerce code is associated with commercial transactions of the user of the unique commerce code;

in response to the step of inputting, displaying to the user correlating historical commercial transaction information associated with the unique commerce code, which displayed correlating historical commercial transaction information has associated therewith corresponding routing information over the network to other locations on the network,

at least one of which is the remote commerce provider's location on the network;

allowing the user the option of selecting the routing information to the remote commerce provider's location on the network; and

in response to the user selecting, connecting of the user location to the remote commerce provider's location (see response to claim 1).

In regards to claim 22, Rhoads teaches wherein the step of displaying in response to the step of inputting comprises the steps of:

connecting to a commerce transaction location on the network that is associated with the unique commerce code in the step of inputting (col 23, lines 1-10);

the commerce transaction location having associated therewith a relational database with a plurality of information blocks of commercial transaction information associated with at least a portion of each of a plurality of unique commerce codes (col 22, lines 24-37); and

comparing the received at least a portion of the unique commerce code with the database and, if a match exists, returning the associated information block of commercial transaction information to the user (col 22, lines 42-45).

In regards to claim 23, Rhoads teaches wherein the returned information block is unique to the at least a portion of the unique commerce code transmitted thereto (see response to claim 22).

In regards to claim 24, Rhoads teaches wherein the unique commerce code is comprised of a first portion that is associated

with routing information to the commercial transaction location on the network and a second portion that is related to the associated information block of commercial transaction information in the database, the second portion corresponding to the at least one portion (col 16, lines 14-35).

In regards to claim 25, Rhoads teaches wherein the step of connecting comprises the steps of:

routing at least a portion of the unique commerce code to an intermediate location on the network (col 22, lines 43-45),

the intermediate commerce location containing a database with relation information between a plurality of the at least portion of the unique commerce codes to network addresses of commercial transaction locations on the network (see response to claim 1);

comparing the received at least portion of the unique commerce code with information in the database (col 51, lines 51-65); and

if a match exists, returning the routing information to the commercial transaction location on the network and connecting thereto (Col 22, lines 50-67, authorized access).

In regards to claim 26, Rhoads teaches wherein the unique commerce code has a first portion that is stored in the database associated with the intermediate location on the network for determining the location of the commercial transaction location network and

a second portion associated with the database at the commercial transaction location on the network for determining the information to be returned to the user (col 22, lines 24-42), website, authorization).

In regards to claim 27, Rhoads teaches wherein the unique commerce code is disposed on a substrate and the step of inputting comprises reading the unique commerce code disposed on the substrate (see response to claim 2).

In regards to claim 28, Rhoads teaches wherein the step of reading the unique commerce code comprises using a bar code reader (see response to claim 3).

In regards to claim 29, Rhoads teaches wherein the substrate comprises a credit card (col 22, lines 43-45).

In regards to claim 30, Rhoads teaches wherein the credit card, in addition to having the unique commercial code associated therewith, has additional identification information for the

purposes of utilizing the credit card in a in a (*sic*) commercial transaction outside the step of inputting (col 24, lines 13-24).

In regards to claims 31-40, applicant regards these claims as “mirroring” (parallel claims) those claims previously prosecuted in claims 1-30. Since these claims are considered to be parallel claims they are rejected for the same rational as that stated above.¹³⁰

Regarding Claims 6 and 16, the Examiner stated in the Final Office Action dated July 3, 2006:

Rhoads teaches the use of a scanner, but does not specifically mention that the scanner is wireless. It was old and well known in the art at the time of the invention to use wireless scanners to input information to a user computer. It would have been obvious to a person having ordinary sill in the art at the time of the invention to include in Rhoads the use of a wireless scanner, because this would provide mobility and allow a person to scan a heavy object that is away from the personal computer, thus providing more efficiency to the system.¹³¹

Appellants submit that the Examiner simply has broken Appellants’ invention into its component parts and then attempted to find a prior art reference corresponding to each component to support an obviousness rejection under 35 U.S.C. § 103. In order to establish a *prima facie* case of obviousness using the combinations of *Rhoads*, *Kramer*, and *Morrison*, and the further combination with an *Official Notice*, the Examiner must first show that each of the references is analogous prior art and then provide an explanation as to whether the overall disclosures of the references, the teachings therein and the suggestions associated therewith, in addition to the level of skill in the art, support a conclusion of obviousness as it relates to the entire invention. Appellants submit that the Examiner’s combinations of *Rhoads*, *Kramer*, *Morrison*, and the *Official Notice* are conclusory, and that no articulated reasoning with some rational underpinning to support the combination has been provided. Further, Appellants submit that support for the combination is based on hindsight and that the combination is improper.

¹³⁰ See Final Office Action mailed September 22, 2006, page 13.

¹³¹ See Final Office Action mailed September 22, 2006, page 13; Office Action mailed January 23, 2006, page 13, Final Office Action mailed March 28, 2005, page 13; Office Action mailed May 7, 2004 page 14.

1. Independent Claim 1 as rejected by the combination of *Rhoads, Kramer and Morrison*.

In the Final Office Action mailed September 22, 2006, the Examiner maintains his 35 U.S.C. § 103 rejection of Claims 1-5, 7-15 and 17-40. On pages 3 and 4 of the Final Office Action, the Examiner states:

“In regards to claim 1, Rhoads discloses a method of accessing a vendor web site disposed on a network at the vendor location thereon using personal account information of a user retrieved from a credit card company server disposed on the network at a credit card location thereon, comprising the steps of:

at a user location disposed on the network, reading a machine resolvable code(MRC on the credit card of the user with a reading device (col 22, lines 15-67 and abstract);

extracting coded information from the MRC (col 5, lines 25-30);

obtaining routing information associated with the coded information, which routing information corresponds to the personal account information of the user stored on the credit card company server disposed on the network (col 22, line 25-40);

connecting the user location to the credit card company server across the network in accordance with the routing information (col 22, line 25-40).

. . . presenting the personal account information to the user at the user location (Rhoads, abstract and summary, Kramer, FIG 1); and

providing a hyperlink to a web site of a vendor in the personal account information for automatic connection of the user location to the vendor web site in response to the selection thereof (Kramer FIG 3B).

In the same paragraph, the Examiner further states “[Rhoads] does not specifically mention that the returned personal information contains routing information relating to vendors that previously had been commercially related with the user.”¹³² The Examiner offers to combine

¹³² See Final Office action mailed September 22, 2006, pages 3 and 4; Office Action mailed January 23, 2006, page 4.

Rhoads with *Kramer* to “[disclose] obtaining credit card data from a client machine that includes routing information relating to vendors that previously had been commercially related with the user (FIG 3B).”¹³³ The Examiner further states that “[the] combination of *Rhoads/Kramer* . . . does not specifically mention that the a (*sic*) transaction is taking place with the connection to the credit card company.” The Examiner then offers to combine *Rhoads-Kramer* with the *Morrison* reference to “[teach a credit card web site] where online merchants are accessed to encourage secure transaction.” The Examiner concludes that “it would have been obvious to one of ordinary skill in the art at the time of the invention was made to include in *Rhoads* routing information relating to vendors that previously had been commercially related with the user . . . [and] . . . [it] would have been obvious to a person having ordinary skill in the art at the time the invention [was made] to include in *Rhoads/Kramer* conducting transaction from the credit card company web site.”¹³⁴ The Examiner concludes that one would have been motivated to make these combinations “because [*Rhoads-Kramer*] would provide a safe platform from which to launch secure online purchasing and create a comfort level for the user, thus increasing usage and sales . . . [and because *Rhoads-Kramer-Morrison*] would provide greater security and increase the comfort level of people shopping on the internet, thus increasing revenue.”¹³⁵

2. The Cited References – Analogous Art Test.

The Examiner has provided *Kramer* and *Morrison* to cure the deficiencies in *Rhoads* regarding returning personal account information containing routing information relating to vendors that previously had been commercially related with the user; and completing a financial transaction with a selected vendor utilizing a connection to the credit card server to add purchases to the credit card account associates with the credit card of the user. The Examiner has provided *Kramer* for the disclosure of “illuminating a users credit card statement.”¹³⁶ The Examiner has provided *Morrison* for the disclosure of “merchants linked to the Visa’s New

¹³³ See Final Office action mailed September 22, 2006, pages 3 and 4; Office Action mailed January 23, 2006, page 4.

¹³⁴ See Final Office action mailed July 03, 2006, page 4.

¹³⁵ See Final Office action mailed July 03, 2006, page 4.

¹³⁶ See *Kramer* Col 6, lines 47-67; Col 7, lines 1-15.

Zealand site.”¹³⁷ Thus, the question that must be answered in the instant application is whether the combination of *Rhoads*, *Kramer* and *Morrison* constitute analogous-art.

a. Discussion of U.S. Patent No. 6,311,214 to *Rhoads*

The primary reference cited by the Examiner is *Rhoads*. The primary purpose of *Rhoads* is to provide a system that gives a user the ability to use an optical input to interface with computers; thus, enabling everyday objects to communicate their identities and functions.¹³⁸ The *Rhoads* system incorporates an optical sensor, such as a digital camera, a computer, and a network connection.¹³⁹ Various objects, such as mail, a book, business cards, or consumer products can contain “Bedoop” data.¹⁴⁰ Bedoop data is any form of digital encoding recognized by the system and capable of initiating some action. In the preferred embodiment, Bedoop data is steganographically encoded (e.g., digitally watermarked). This data can be through techniques that operate by slightly changing the luminance, or contours, of selected points on artwork or text printed on a carton. Therefore, Bedoop data may be imperceptible to the human eye. However, a computer scan can detect these characteristics. Once detected, the computer emits a “Bedoop” sound to confirm a successful decoding of the Bedoop data.¹⁴¹

The optical sensor first locates a Bedoop object; second determines the objects orientation; and finally, extracts the Bedoop data.¹⁴² A Bedoop data payload is divided into three fields; Class, DNS, and UID. The Class and DNS ID’s identify the server and computer that will respond to the Bedoop data while the UID determines what the response will be.¹⁴³

Rhoads discloses various examples illustrating how the Bedoop data is utilized. Upon emptying a container of milk, a user may scan the container with an optical sensor attached to the refrigerator. A computer in the refrigerator then adds milk to a proposed shopping list. The user can view the list, preferably, with a display attached to the refrigerator. The user may then add to the list or delete items from the list. Through this action, an order may be placed to a local

¹³⁷ See *Morrison*; Abstract (Document Summary).

¹³⁸ See *Rhoads* Col. 2, lines 19-27.

¹³⁹ See *Rhoads* Col. 2, lines 64-67; Figure 1.

¹⁴⁰ See *Rhoads* Abstract.

¹⁴¹ See *Rhoads* Col. 3, lines 1-29.

¹⁴² See *Rhoads* Col. 5, lines 25-30.

¹⁴³ See *Rhoads* Col. 7, lines 8-36.

grocery store to add this item to a shopping list. The grocer may pull the groceries and notify the user when ready or just await the user's arrival.¹⁴⁴

Additionally, an excel document may be printed with Bedoop data that is steganographically encoded therein. The user may hold the document up to an optical scanner in order to retrieve the original computer file.¹⁴⁵ In other examples, a driver's license may be scanned to access records controlled by the Department of Motor Vehicles; or, another government site may be accessed.¹⁴⁶ Additionally, an optical sensor may be used to scan a credit card in order to access bank records.¹⁴⁷ A user may scan a card supplied by a local vendor to take advantage of incentives offered by that vendor.¹⁴⁸ Many additional objects, such as CDs, DVDs and Post-it® notes can have Bedoop data placed thereon. The user may also manipulate the computer processes by moving the object containing the Bedoop data; thereby replacing the computer mouse and keyboard.¹⁴⁹ Through these means and methods, a user can control computer functions through the use of familiar paper items instead of through computer input peripherals.¹⁵⁰

b. Discussion of U.S. Patent No. 6,327,574 to Kramer

Kramer discloses a system for targeting content to users based on profile data. The system incorporates the interpretation and augmentation of structured documents.¹⁵¹ The system is operable to create a user profile. Additionally, the system is operable to augment only those structured documents that are capable of being delivered to a user electronically.¹⁵² One such structured document is a credit card statement. The system "illuminates" the statement. Illumination is the process of annotating or replacing sections of documents or other media with (possibly) related multimedia content. For example, the name of a company might be altered to include the graphical logo of the company; a hyperlink to the web site homepage of the

¹⁴⁴ See *Rhoads* Col. 3, lines 30-57.

¹⁴⁵ See *Rhoads* Col. 3, lines 57-67; Col. 4, lines 1-26.

¹⁴⁶ See *Rhoads* Col. 22, lines 24-38; lines 46-65.

¹⁴⁷ See *Rhoads* Col. 22, lines 42-45.

¹⁴⁸ See *Rhoads* Col. 33, lines 1-8.

¹⁴⁹ See *Rhoads*, Col 1, lines 34-48.

¹⁵⁰ See *Rhoads*, Col. 36, lines 1-6.

¹⁵¹ See *Kramer*, Abstract.

¹⁵² See *Kramer*, Col. 5, lines 30-61; Col. 9, lines 65-67; Col. 10, lines 1-2.

company; a video presentation; or other information.¹⁵³ Additionally, the system can illuminate web sites or coupons.¹⁵⁴

The system chooses what content to present to the user based on user profiles.¹⁵⁵ The system creates profiles for each user. The user profile is based on the information derived from electronically delivered structured documents and from consumer behavior. Thus, the profile creates an assessment of the user's interests, preferences and demographics. Changes in the user's interests, preferences and demographics result in changes to the profile.¹⁵⁶ A TIC server uses four types of information to compile the user profile.¹⁵⁷

The first type of information used is personal information and online behavior. Personal information is information such as a social security number. The system uses this, and other personal data like this, to create demographic information such as age, sex, marital status, and the number and ages of children. Online behavior includes information such as what software is on the user's computer, what websites the user has visited, and how recently and frequently the user visits those websites. This information includes what content the TIC server has shown to the user; and what content the user acted upon.¹⁵⁸

The second type of information used by the TIC server is transaction histories and summaries. This information is a report driven accounting of the user's purchases and activities. The TIC server compiles standard reports, such as credit card statements, to derive a schema and summary of a user's purchases. The TIC server places this information from a given report into a common schema or summary, regardless of the source. The schema for a credit card, for example, would include date of sale, amount, merchant identifier, location and a reference number.¹⁵⁹

The third type of information used by the TIC server is conjectures about the psychographics and demographic attributes of the consumer. Here, the TIC server adjusts the

¹⁵³ See *Kramer* Col. 6, lines 8-67; Col. 7, lines 1-44.

¹⁵⁴ See *Kramer* Col. 8, lines 1-23.

¹⁵⁵ See *Kramer* Col. 13, lines 6-19.

¹⁵⁶ See *Kramer* Col. 3, lines 10-21.

¹⁵⁷ See *Kramer* Col. 14, lines 12-23.

¹⁵⁸ See *Kramer* Col. 14, lines 35-51.

¹⁵⁹ See *Kramer* Col. 14, lines 51-67; Col. 15, lines 1-9.

profile based on predictions that could cause fundamental changes in the user profile. Items, such as a birth, marriage or the purchase of a house, result in important changes in the user behavior. This is purely theoretical. Additionally, as a fourth information type, the system makes conjectures about an individual viewer. The system analyzes the current viewer's online behavior in order to distinguish the viewer from other viewers in the same unit (household) that utilize the same computer system.¹⁶⁰

If the user enables the system to illuminate documents, the TIC server, upon the request of a document for viewing by the user, will access the TIC database in order to determine how the document should be illuminated. Additionally, the TIC server updates the user profile based on the report (document) requested by the user. A selection engine, using the user profile and general policies, determines which illumination elements will be placed on the document. The general policies include various parameters like number of illuminations per document and rules to form queries executed against content databases. For a given illuminable element on a document, the TIC server uses factors based on the user profile and several consumer models to determine what might appeal to the user. The TIC server communicates with other servers to create and then obtain the appropriate URLs, metadata, or other images in order to illuminate a document.¹⁶¹ As such, the TIC server determines what content to present to the viewer.¹⁶²

The system creates numerous queries based on the user profile, an attribute of interest, and a Boolean abstractor to be used by content providers. The system can tailor the queries through the attribute vector. Elements of the attribute vector express user interests, preferences, or demographics. The Boolean abstractor operates on the attribute vector in order to create a list of illuminations that will be of interest to the user.¹⁶³ In one example, a user may have an interest in golf. The user may have purchased a new set of clubs, made travel arrangements to a golf resort, or subscribed to a golf magazine. It would be nearly impossible for a content provider to craft a query to identify the user's interest in golf. However, the TIC server easily creates a query based on the attribute "golf interest" and defines a threshold for the occurrence of

¹⁶⁰ See *Kramer*, Col. 14, lines 17-34.

¹⁶¹ See *Kramer*, Col. 19, lines 40-67; Col. 20, lines 1-52.

¹⁶² See *Kramer* Col. 13, lines 5-19.

¹⁶³ See *Kramer*, Col. 21, lines 7-61.

the attributes. Thus, the content provider is now able to provide targeted content relating to golf items to the user.¹⁶⁴

c. Discussion of Non Patent Literature (NPL 892) to *Morrison*

Morrison discloses a promotion by VISA New Zealand. The promotion is designed to encourage online buying. In order to address consumer security concerns with online buying, VISA setup a website, www.shopwithvisa.co.nz, with vendors linked thereto. The Visa site contains links to 19 online vendors. Visa endorsed the vendors by stating that the vendors met a high standard of business practice and integrity. The vendor's business practices covered consumer privacy, customer service and data and payment security. Visa is heavily promoting the website before Christmas.

3. Conclusion – Analogous Art Test.

Rhoads is a system that uses a scanner and an image steganographically encoded on an object to replace a mouse and keyboard in the operation of certain functions on a computer. As described above, *Rhoads*, although possibly analogous, is deficient in supporting the 35 U.S.C. § 103 rejection alone because it does not disclose returning personal information containing routing information relating to vendors that previously had been commercially related with the user; or completing a financial transaction with a selected vendor utilizing a credit card web site to add purchases to the credit card account associated with the credit card of the user.

Kramer discloses a system that provides a content provider the ability to present specific content to a user based on the user's profile. *Kramer* "illuminates" electronic documents based on, inter alia, a user's past purchases, current online activity, and demographics. The Examiner is relying on *Kramer* for the element of "personal information containing routing information relating to vendors that previously had been commercially related with the user" of Appellants' Claim 1 missing from *Rhoads*.

Appellants stated in its Response of September 27, 2005, "with respect to scanning and facilitating connection to credit card service, *Kramer* is not analogous."¹⁶⁵ *Kramer* is directed

¹⁶⁴ See *Kramer* Col. 30, lines 30-48

¹⁶⁵ See Appellants' Response dated September 27, 2005, pages 10.

towards illuminating records with information such as logos and hyperlinks in a hyperlink manager to associate them with the vendor or with items of potential interest to a user based on the user profile. The user then must select the information for use thereof. Illumination of structured records based on a user's habits and demographics is not analogous art when a person in the scanner art is looking to combine personal account information with vendor information in response to the scanning of an MRC. There is no suggestion or motivation for one skilled in the art to combine the teaching of *Kramer*, which are not directed to the use of any type of MRC code or redirection of a user to any location, with the teachings of *Rhoads*.

Appellants fail to see how *Kramer* constitutes analogous art. One skilled in the art would not look toward a targeted content manager for privacy preservation, especially a system for privately providing targeted vendor information based on a "user's habits and demographics," for the purpose of "returning personal account information containing links to vendors that were previously associated commercially with the user" especially since the Examiner seeks to apply an *illumination of structured documents based on user habit and demographics* from the *Kramer* system as analogous art in this instance. Therefore, Appellants submit that *Kramer* is not analogous art.

Morrison is an advertisement or, at best, an endorsement directed towards encouraging users to shop online. The Examiner is seeking to combine *Morrison* to cure the deficiencies in the combination of *Rhoads* and *Kramer*. The Examiner is relying on *Morrison* to teach "a transaction taking place with the connection to the credit card company." Specifically the Examiner states:

The combination of Rhoads/Kramer teach (*sic*) accessing account information at a credit card company and using provided links to access vendors, but does not specifically mention that the a (*sic*) transaction is taking place with the connection to the credit card company. Morrison teaches a web site www.shopwithvisa.co.nz where online merchants are accessed to encourage secure transaction. It would have been obvious to a person having ordinary skill in the art at the time of the invention to include in Rhoads/Kramer conducting transaction from the credit card company web site, because this would provide greater

security and increase the comfort level of people shopping on the internet, thus increasing revenue.¹⁶⁶ (emphasis original)

As Appellants previously stated, this article refers to use of a Visa website.¹⁶⁷ The *Morrison* reference merely makes mention that “Mr. Kearney said that merchants linked to Visa New Zealand site met a high standard of business practice and integrity, covering consumer privacy, customer service, and data and payment security.” All comments are attributes of the vendors, not the link. There is no suggestion or motivation for one skilled in the art to combine the teachings of *Morrison*, which are not directed to the use of any type of MRC or the associating the personal information of the user with routing information of vendors that previously were related commercially with the user, with the teachings of *Rhoads* and *Kramer*. Therefore, Appellants submit that *Morrison* also is not an analogous art reference with respect to this element.

Rhoads, taken alone, is insufficient to support a finding of obviousness under 35 U.S.C. § 103. The Examiner agrees with this assertion in the Final Office Action mailed September 22, 2006. Thus, the Examiner provided *Kramer* and *Morrison*. MPEP § 2141.01(a) states that for a prior art reference to be relied upon as basis for a 35 U.S.C. § 103 rejection, the reference must be analogous prior art. *Kramer* and *Morrison* are not analogous prior art references. Therefore, the use of the non-analogous *Kramer* and *Morrison* references to support an obviousness rejection is improper, and the Examiner has failed to establish a *prima facie* case of obviousness.

4. The Cited References – Teaching/Suggestion/Motivation Test.

Regardless of whether *Kramer* and *Morrison* are found to be analogous art using the analogous-art test, the next step for determining obviousness is to analyze under the teaching-suggestion-motivation test. As previously discussed, the recent *KSR* Supreme Court case indicated that the Teaching-Suggestion-Motivation (TSM) test is not a rigid test; however, it is still considered to be a factor. Under this test, each of the references must contain some type of teaching, as well as some type of suggestion, to allow for the combination. One also must be motivated to combine the references. If this test alone is utilized, the questions that must be

¹⁶⁶ See Final Office Action mailed September 22, 2006, page 4.

¹⁶⁷ See Appellants’ Response dated July 17, 2006, page 11.

answered are whether *Rhoads*, *Kramer* and *Morrison* contain any teaching that would suggest to one skilled in the art to combine these three references to overcome the problem addressed by the present application, and whether any motivation to so combine exists.

a. Discussion of *Rhoads* – TSM Test

Independent Claim 1 of the instant application, as currently presented, is directed to a method of accessing a vendor web site disposed on a network at the vendor location thereon using personal account information of a user retrieved from a credit card company server disposed on a network at a credit card location thereon. The first step is to read, at a user location disposed on the network, a machine-resolvable code (MRC) on a credit card of a user with a reading device. Further, Claim 1 requires that the credit card of the user, with the MRC thereon, was issued by a credit card company. Then, Claim 1 requires extracting coded information from the MRC. The next step of Claim 1 requires obtaining routing information associated with the coded information, which routing information corresponds to the personal account information of the user stored on the credit card company server disposed on the network. Claim 1 then requires connecting the user location to the credit card company server across the network in accordance with the routing information. *In response to the step of extracting*, Claim 1 requires the returning of personal account information from the credit card company server to the user location. Further, Claim 1 requires that the returned personal account information contain routing information relating to vendors that previously had been commercially related with the user. Although *Rhoads* discloses reading coded information disposed on an object and accessing a web site that is specified by the coded information, Appellants and the Examiner agree that *Rhoads* does not disclose returning personal account information that contains routing information relating to vendors that previously had been commercially related with the user. Furthermore, *Rhoads* contains no suggestion or teaching for returning personal account information containing routing information relating to vendors that previously had been commercially related with the user or that such would be useful for its intended purpose.

As previously described, the purpose of *Rhoads* is to provide a system that gives a user the ability to use an optical input to interface with computers; thus, enabling everyday objects to communicate their identities and functions.¹⁶⁸ The *Rhoads* system incorporates an optical sensor, such as a digital camera, a computer, and a network connection.¹⁶⁹ The problems sought to be solved by *Rhoads* relate to the control of a computer through the use of paper objects instead of other peripheral devices, such as a mouse or keyboard.¹⁷⁰ Objects preferably are steganographically encoded with information that is often imperceptible to the human eye.¹⁷¹ An optical scanner is capable of detecting the steganographically encoded data. Once detected, a computer acknowledges the detection by emitting a “Bedoop” sound.¹⁷² The encoded data is divided into three fields: Class, DNS and UID. The Class and DNS identify the server and computer that will respond to the data while the UID determines what the response will be.¹⁷³ A steganographically encoded excel document can be scanned to retrieve that document for editing.¹⁷⁴ Additionally, the optical scanner can scan a driver’s license or other government issued document to access records controlled by the Department of Motor Vehicles or other government records respectively. *Rhoads* is also operable to scan a credit card in order to access bank records.¹⁷⁵

Rhoads provides a way for users to access resources on a computer, whether local or remote, without the need of a peripheral device such as a keyboard or mouse. *Rhoads* is directed towards placing a scan-able code on an object. *Rhoads* scans this code in order to facilitate the control of certain computer functions. *Rhoads* discloses numerous methods and applications wherein a computer process is enhanced. These enhancements, in some cases, effectively result in the elimination of a need to use a mouse or keyboard. In one example, *Rhoads* discloses scanning a credit card. The card is scanned in order to process a payment of selected item on a previously selected vendor site. By manipulating the position of the card, the system processes mailing instructions as well. In a summary of the invention, *Rhoads* discloses the following:

¹⁶⁸ See *Rhoads* Col. 2, lines 19-27.

¹⁶⁹ See *Rhoads* Col. 2, lines 64-67; Figure 1.

¹⁷⁰ See *Rhoads*, Col. 36, lines 1-6.

¹⁷¹ See *Rhoads*, Col 3, lines 1-29.

¹⁷² See *Rhoads*, Col 3, lines 1-29.

¹⁷³ See *Rhoads*, Col 7, lines 8-36.

¹⁷⁴ See *Rhoads*, Col 3, lines 57-67; Col. 4, lines 1-26.

¹⁷⁵ See *Rhoads*, Col 22, 42-45.

“Bedoop.” That might be the sound that someone might hear as they lazily place a magazine advertisement in front of their desktop camera. Magically, the marketing and sales web site associated with the ad is displayed on their computer. More information? Want to buy now? Look at the full product line? No problem.

“Bedoop.” That might be the same sound when that same someone places their credit card in front of their desktop camera. Instantly, the product displayed on the web page is purchased. Behind the scenes, a secure purchase link is initiated, transmitting all requisite information to the vendor. Twist the credit card clockwise and the purchaser chooses overnight delivery.

So goes an exemplary embodiment of the invention further described in this application. Though this example is rather specific, it nevertheless alludes to an indescribably vast array of applications possible *when a digital camera or other optical sensing device is turned into a general purpose user interface device with an intuitive power that very well might rival the mouse and the keyboard.*¹⁷⁶ *(emphasis added)*

Clearly, *Rhoads* discloses another mechanism to be used in addition to, or even in replacement of, other computer peripherals, such as a mouse or keyboard. *Rhoads* is disclosing a system to use common items as sources of computer control in the way a user currently utilizes a mouse or keyboard. However, *Rhoads* only discloses that an MRC encoded on an object, such as a credit card, can be used to *access a site or manipulate* simple commands on a computer. *Rhoads* discloses:

Drivers licenses, social security cards, or other identity documents may be encoded by the issuing authority with Bedoop data that permits access to the holder’s personal records over the web. On presenting the document to a Bedoop system, the system directs a web browser to a private address corresponding to data encoded on the document. At that address, the holder of the document can review governmental records, such as state or federal tax return data, social security entitlements, etc., as well as privately maintained records, such as credit reports, etc. User selection among various functions can be effected by spatial manipulation of the document. (Entry of additional data, such as social security number or mother’s maiden name, may be required

¹⁷⁶ See *Rhoads*, Col. 1, lines 34-41.

of the user to assure privacy in case the document is lost or stolen).¹⁷⁷

Rhoads does not disclose a relationship between the scanned data and what is returned to the user in response to the scanning of the encoded data. In the Response dated March 17, 2004, Appellants stated that *Rhoads* only provides embedded information on a document that may be used as a link to a web site. This information does not link to a particular document on the web, whether that site is a credit card server or other location. *Rhoads* does not disclose or provision to provide back, in response to the operation of scanning of the embedded code, information associated with the user's account. Additionally, *Rhoads* does not disclose that any information returned would contain embedded hyperlinks associated to vendors that had a previous commercial relationship with the user.¹⁷⁸ The Examiner agrees, stating:

Rhoads teaches accessing a website that is specified by the MRC encoded on a device such as a credit card (col 22, lines 40-45), and obtaining credit card data (col 22, lines 25-40), but does not specifically mention that the returned personal account information contains routing information relating to vendors that previously had been commercially related with the user.¹⁷⁹

As such, *Rhoads* does not teach returning the personal account information from the credit card company server to the user location in response to the step of extracting, which returned personal account information contains routing information relating to vendors that previously had been commercially related with the user.

In the next step, Claim 1 requires the presenting of personal account information to the user at the user location. Additionally, Claim 1 requires providing a hyperlink to a web site of a vendor in the personal account information for automatic connection of the user location to the vendor web site in response to the selection thereof by a user in a selection operation.

Since *Rhoads* does not disclose returning personal account information that contains routing information relating to vendors that previously had been commercially related with the user, *Rhoads* also does not disclose providing a hyperlink to a web site of a vendor in the

¹⁷⁷ See *Rhoads*, Col. 22, lines 25-40.

¹⁷⁸ See Response dated March 17, 2004, pages 7 and 8.

¹⁷⁹ See Final Office Action mailed September 22, 2006, pages 3 and 4.

personal account information for automatic connection of the user location to the vendor web site in response to the selection thereof by a user in a selection operation. As such, *Rhoads* can not disclose completing a financial transaction with the selected vendor in the selection operation to make a purchase, and utilizing the connection to the credit card server made in the step of connecting the user location to the credit card company to add purchases to the credit card account associated with the credit card of the user, as required by the final step of Claim 1.

According to the present application, a user scans a code on a credit card provided by a credit card company. In response to the scanning of the code, the system opens a link to the credit card company *and* returns personal account information of the user. The personal account information *contains hyperlinks to vendors* that the user previously had been related with commercially. Returning hyperlinks to vendors as part of the personal account information allows the user to then select one of these vendors and complete a financial transaction utilizing the same link with the credit card company that previously was established when the user first scanned the credit card. Therefore, returning hyperlinks to vendors as part of personal information does not facilitate the purpose of *Rhoads*, i.e., to provide documents to be used a user interfaces to computers involving optical input.¹⁸⁰

Thus, to apply *Rhoads* for the purpose of obviating Claim 1 in the present application, the Examiner must show that *Rhoads* contains a teaching, suggestion, or motivation to solve the problem solved by Appellants' present claims. *Rhoads* must also suggest that, at the time of the invention, a problem existed that could be solved by incorporating the returning of personal account information containing routing information to vendors that were previously commercially related to the user; and that the returning of personal account information containing hyperlinks to vendors could be utilized in the *Rhoads* system for the purpose of, in response to scanning the MRC on a credit card, opening a link to a credit card company and allowing a user to select a vendor and complete a financial transaction using the opened link with a credit card company. *Rhoads* does not contain any such teaching, suggestion or motivation.

¹⁸⁰ See *Rhoads*, Col. 2, lines 19-20.

b. Discussion of U.S. Patent No. 6,327,574 to *Kramer et al.*

The Examiner has provided *Kramer* to cure the deficiencies in *Rhoads*. Specifically, the Examiner has relied on *Kramer*, “[to teach] obtaining credit card data from a client machine that includes routing information relating to vendors that previously had been commercially related with the user.”¹⁸¹ The Examiner further states:

Kramer teaches obtaining credit card data from a client machine that includes routing information relating to the vendors that previously had been commercially related with the user (FIG 3B) . . .

presenting the personal account information account information to the user at the user location (Rhoads, abstract and summary, *Kramer* FIG 1); and

providing a hyperlink to a web site of a vendor in the person account information for automatic connection of the user location to the vendor web site in response to the selection thereof (*Kramer* FIG 3B).

“It would have been obvious to one of ordinary skill in the art at the time of the invention to include in Rhoads routing information relating to vendors that previously had been commercially related with the user because (*sic*) would provide a safe platform from which to launch secure online purchasing and create a comfort level for the user, thus increasing usage and sales.”¹⁸²

Kramer discloses a system for interpreting and augmenting structured documents based on a customer profile. The system “illuminates” electronically delivered documents while maintaining security over information that is personal and confidential to the consumer.¹⁸³ Illumination is the process of annotating or replacing sections of documents or other media with other content. *Kramer* illuminates electronically delivered credit card statements, web sites, or electronic coupons based on a consumer profile.¹⁸⁴ *Kramer* uses personal data, past transactions, online behavior, and conjectures about an individual viewer to create the user profile.¹⁸⁵ *Kramer* discloses that the consumer may choose to enable the system to illuminate documents to be

¹⁸¹ See Final Office Action mailed September 22, 2006, page 4; Office Action mailed.

¹⁸² See Final Office Action mailed September 22, 2006, page 4; Office Action mailed April 07, 2005.

¹⁸³ See *Kramer*, Abstract.

¹⁸⁴ See *Kramer*, Col 6, lines 8-67; Col. 7, lines 1-44.

¹⁸⁵ See *Kramer*, Col. 14, lines 12-67.

received. A TIC server accesses a TIC database in order to determine how the document is to be illuminated if the consumer has chosen to enable the system.¹⁸⁶

In its Response, Appellants stated “both the *Rhoads* and the *Kramer* et al references lack any disclosure on the concept of scanning the credit card, which step of scanning automatically accesses to the user historical information regarding their account.”¹⁸⁷ The Examiner has provided FIG. 3B to provide a teaching for obtaining credit card data from a client machine and providing a hyperlink to a web site of a vendor in the personal account information for automatic connection of the user location to the vendor web site in response to the selection thereof.¹⁸⁸ The Examiner has not cited any portion of *Kramer* text in support of this teaching. However, in one embodiment, *Kramer* does disclose illuminating the credit card statement of a user. The specific disclosure sets forth as follows:

FIGS. 3A and 3B illustrate and example illumination of a credit card statement. In FIG. 3A there is shown a credit card statement 300 as it would appear on a consumer's computer without the benefit of illumination according to the present invention. Such a statement 300 would be transmitted electronically from the computer system of a credit card company (or comparable financial institution) to the consumer's personal computer for review, and perhaps payment of outstanding balances. This statement 300 simply lists each transaction 302 as a simple line of text, with the normal descriptor of date, merchant name, transaction identifier, location, and amount. *The opportunities for targeted advertising based on these individual transactions are wasted.*

Now considering FIG. 3B, there is shown the credit card statement 304 after illumination in accordance with the present invention. First, many of the simple text-only merchant names have been replaced by graphic icons 307 illustrating the merchant's particular tradename or mark. This reinforces brand identity right at the point the consumer is reviewing a particular transaction with the merchant. Second, co-branding is facilitated by the inclusion in some transaction of a graphic icon 308 for second merchant's good/services. For example, in the transaction line for the Chevron® charge, and icon 308 for Mercedes-Benz®

¹⁸⁶ See *Kramer*, Col. 19, lines 40-67, Col. 20, lines 1-52.

¹⁸⁷ See Response dated November 08, 2004, page 10.

¹⁸⁸ See Final Office Action mailed September 22, 2006 at page 4; Office Action mailed January 23, 2006 at page 4.

cars is included. The selection of which second merchant's icon 308 to include in the transaction is based on the consumer's profile which is used to select one of a number of variable content alternatives that are encoded in the credit card statement when it is received electronically.

Third, illumination provides for the replacement of static text, such as merchant's name, with a hyperlink 310 to the merchant's web site (*or any other web site, as determined by the selectable content alternative data*). Thus, here illumination transforms the otherwise static credit card statement into a dynamic document that allows the consumer to immediately access more information about a merchant during the process of reviewing the credit card statement.¹⁸⁹ (*emphasis added*)

Kramer discloses that the credit card company transmits the credit card statement electronically to the user. The user receives this statement for review and payment of outstanding balances. This is in accordance with standard billing practices used by most, if not all, financial institutions. *Kramer* does not disclose that this statement could be retrieved in response to any action by the user such as scanning the credit card. Appellants previously noted that *Kramer* does not contain any teaching, suggestion or motivation for in any way utilizing machine readable codes or scanning.¹⁹⁰ *Kramer* is concerned only with providing targeted advertising in a secure manner.

The claims of the instant application require "the returning of personal account information from the credit card company server to the user location *in response to the step of extracting*, which returned personal account information contains routing information relating to vendors that previously had been commercially related with the user." *Kramer* discloses that the user decides whether or not a document will be illuminated. The specific discloser sets forth:

After any necessary TIC installation has been completed, the JavaScript preamble in a TIC enable page determines 710 whether TIC processing has been disable on the client. (*Disabling of TIC would typically be done at the request of the viewer.*) If so, then the page is passed 708 through to the browser without any TIC processing. Otherwise the page is passed to a top-level routine which parses the page and determines 712 whether there is any

¹⁸⁹ See *Kramer*, Col 6, lines 47-67; Col 7, lines 1-15.

¹⁹⁰ See Response dated September 27, 2005, page 10.

interpretable or illuminable content. If there is interpretable content, it determines 714 whether the report has already been interpreted. If not, then depending on policy 716 it may schedule it to be interpreted later by the interpreter process or have it interpreted 718 immediately. If it has illuminable content 726, the illuminator is invoked 728; otherwise the page is just passed 730 through the browser for display.¹⁹¹ (*emphasis added*)

Prior to inserting hyperlinks into a page (i.e., illuminating), *Kramer* first looks at the user computer to determine if illuminating has been enabled; then, if enabled by user settings, *Kramer* illuminates the page. Clearly, the user (i.e., the viewer) has some control whether or not the page is illuminated.¹⁹² Thus, *Kramer* illuminates a credit card statement in response to the credit card company transmitting the document in an “illuminable” format *and* the user enabling the system to illuminate it.

Further, Claim 1 requires “*completing a financial transaction with the selected vendor in the selection operation to make a purchase, and utilizing the connection to the credit card server made in the step of connecting the user location to the credit card company to add purchases to the credit card account associated with the credit card of the user.*” The *Kramer* system is operable to illuminate a credit card statement electronically transmitted to a consumer. *Kramer* does not disclose that a connection is maintained with the credit card company server. Further, *Kramer* contains no teaching, suggestion or motivation that the initial connection could be used to conduct a financial transaction with a vendor. As such, *Kramer* also fails to provide a teaching, suggestion or motivation that, if a financial transaction occurred using the credit card company server, the transaction would result in the adding of purchases to the credit card account associated with the credit card of the user.

The Examiner identified a particular element in the prior art, that being the limitation of routing information relating to vendors being provided as part of as part of a credit card statement of a user. *Kahn* states that “a mere identification in the prior art of each element is insufficient to defeat the patentability of the combined subject matter as a whole.”¹⁹³ Rather than concentrate on this element, the Examiner is required to articulate the basis on which the

¹⁹¹ See *Kramer*, Col. 19, lines 63-67; Col. 20, lines 1-10.

¹⁹² See also *Kramer*, FIG. 7, reference number 710.

¹⁹³ *Kahn*, 441 F.3d at 986.

Examiner concludes that it would have been obvious to make the claimed invention, i.e., why one of ordinary skill in the art would have been motivated to select the references and to combine them in order to render the claimed invention obvious. The Examiner's indication that routing information relating to vendors exists does not show the existence of such teaching. Thus, the Examiner has not met a *prima facie* case by stating, "[it] would have been obvious to one of ordinary skill in the art at the time of the invention to include in Rhoads routing information relating to vendors that previously had been commercially related with the user because (*sic*) would provide a safe platform from which to launch secure online purchasing and create a comfort level for the user, thus increasing usage and sales;"¹⁹⁴ or, as previously stated by the Examiner, that "[it] would have been obvious to a person having ordinary skill in the art at the time of the invention to include in Rhoads accessing a credit card company directly to obtain the credit card information, because this would provide direct access and save the user time by stream lining the system . . . [and] to include in Rhoads the routing information relating to vendors that previously had been commercially related with the user as taught by Kramer, because this would provide marketing opportunities for vendors and thus create a stream of income thus boosting profits."¹⁹⁵

Kramer contains no teaching, suggestion, or motivation to provide "in response to a step of extracting coded information from an MRC on a credit card of a user, returning personal account information from the credit card company server to the user location, which returned personal account information contains routing information relating to vendors that previously had been commercially related to the user." Both *Rhoads* and *Kramer* fail to disclose the step of scanning of the MRC on a credit card to automatically access the user historical information regarding the user's credit card account. Due to the fact that the routing information is inserted in an electronically transmitted document in response to a user controlled setting as well as a user's profile, reliance on this one particular aspect is insufficient to show any motivation, suggestion, or teaching that would lead one skilled in the art at the time of the invention to combine the teachings of *Kramer* with *Rhoads* to allow one with the teaching of *Rhoads* in front of them to return personal account information from the credit card company server to the user

¹⁹⁴ See Final Office Action mailed September 22, 2006, page 4; Office Action mailed January 23, 2006, page 4.

¹⁹⁵ See Final Office Action mailed March 28, 2005, page 5; Office Action mailed May 7, 2004, page 5.

location *in response to the step of extracting*, which returned personal account information contains routing information relating to vendors that previously had been commercially related with the user. Additionally, reliance on *Kramer's* "illumination" does not provide a teaching, suggestion or motivation that would lead one skilled in the art at the time of the invention to combine with *Rhoads* "to provide a hyperlink to a web site of a vendor in the personal account information for automatic connection of the user location to the vendor web site in response to the selection thereof by a user in a selection operation; *and completing a financial transaction with the selected vendor* in the selection operation to make a purchase, and utilizing the connection to the credit card server made in the step of connecting the user location to the credit card company to add purchases to the credit card account associated with the credit card of the user." Further, the Examiner has provided no guidance as to why *Rhoads*, which states that the embedded information is used to control a computer in a manner similar to a keyboard or a mouse, would want to retrieve information containing links to other locations, which makes it difficult to determine why one skilled in the art would be inclined or motivated to retrieve illuminated personal account information. *Rhoads* contemplates only providing computer control through the use of an optical input device.

c. Discussion of Non Patent Literature, reference 892, to *Morrison*.

The *Morrison* reference is an advertisement for Visa New Zealand. *Morrison* discusses Visa New Zealand's promotion to encourage on-line buying. In order to address consumer security concerns with online buying, VISA setup a website, www.shopwithvisa.co.nz, with vendors linked thereto. The Visa site contains links to 19 online vendors. Visa endorsed the vendors by stating that the vendors met a high standard of business practice and integrity. The vendor's business practices covered consumer privacy, customer service and data and payment security. Visa is heavily promoting the website before Christmas.

The Examiner has provided *Morrison* to cure the deficiencies in *Rhoads* and *Kramer*. Specifically, the Examiner has relied on *Morrison* "[to teach] where online merchants are

accessed to encourage secure transaction [from a credit card site].”¹⁹⁶ The Examiner further states:

“It would have been obvious to a person having ordinary skill in the art at the time of the invention to include in Rhoads/Kramer conducting transaction from the credit card company web site, because this would provide greater security and increase the comfort level of people shopping on the internet, thus increasing revenue.”¹⁹⁷

The addition of *Morrison* does not cure the deficiencies of *Rhoads* and *Kramer*. As Appellants previously stated, this article refers to use of a Visa website.¹⁹⁸ *Morrison* does not contain a teaching, suggestion or motivation to combine with *Rhoads* and *Kramer*. *Morrison* recites:

SECURITY concerns holding back online commerce have prompted credit card company Visa to set up a website to encourage online buying.

Visa International electronic commerce manger Michael Kearney said it was hoped the site would attract about a quarter of a million users.

The site, www.shopwithVISA.co.nz, has links to 19 online merchants and is to be heavily promoted before Christmas.

Visa is the most popular credit card in New Zealand, with 1.6 million cards in circulation. The company says 65 per cent of all Internet transactions are by Visa card.

Visa’s New Zealand site is being introduced after the success of its Australian site which has attracted 100,000 unique users since its start last September.

Mr Kearney said the merchants linked to visa’s New Zealand site met a highest standard of business practice and integrity, covering consumer privacy, customer service, and data and payment security.¹⁹⁹

¹⁹⁶ See Final Office Action mailed September 22, 2006, page 5; Office Action mailed January 23, 2006, page 5.

¹⁹⁷ See Final Office Action mailed September 22, 2006, page 5; Office Action mailed January 23, 2006, page 5.

¹⁹⁸ See Appellants’ Response dated July 17, 2006, page 11.

¹⁹⁹ See *Morrison*, pages 1 and 2.

Although *Morrison* references security concerns, *Morrison* does not disclose a teaching regarding how those concerns are addressed. *Morrison* merely makes mention that “Mr. Kearney said that merchants linked to Visa New Zealand site met a high standard of business practice and integrity, covering consumer privacy, customer service, and data and payment security.” Mr. Kearney’s statement amounts to nothing more than an endorsement of the linked merchants, assuring potential consumers regarding the high standards of practice and integrity of the linked merchants. The promotional advertisement indicates links to merchants as well as an anticipated amount of potential users. However, *Morrison* does not discuss what the links to the 19 merchants accomplishes. The comments by Mr. Kearney are attributes of the vendors, not the link. As Appellants stated in a previous response, this article may refer to a merchant’s use of the Visa website.²⁰⁰ However, *Morrison* does not contain a teaching or suggestion for completing a commerce transaction in a manner as required by the claims. Furthermore, *Morrison* contains no enabling disclosure directed towards how a secure transaction, whether by merchant or user, would be completed. There is no suggestion or motivation for one skilled in the art to combine the teachings of *Morrison*, which essentially is an advertisement encouraging online shopping, with the teachings of *Rhoads* and *Kramer*. Reliance on *Morrison* does not provide a teaching, suggestion or motivation that would lead one skilled in the art at the time of the invention to combine with *Rhoads* and *Kramer* “to provide a hyperlink to a web site of a vendor in the personal account information for automatic connection of the user location to the vendor web site in response to the selection thereof by a user in a selection operation; and completing a financial transaction with the selected vendor in the selection operation to make a purchase, and utilizing the connection to the credit card server made in the step of connecting the user location to the credit card company to add purchases to the credit card account associated with the credit card of the user.”

As such, Appellants submit that *Morrison* only discloses a promotion to encourage online shopping. The Examiner has provided no support as to “why” one skilled in the art would combine the “advertisement that mentions links to merchants” of *Morrison* with the Bedoop system of *Rhoads* and further combine with the illumination system of *Kramer*. Due to the fact that both *Kramer* and *Morrison* disclose only links to vendor locations, reliance on this one

²⁰⁰ See Response dated July 17, 2006, page 11.

aspect is insufficient to show any motivation, suggestion or teaching that would lead one skilled in the art at the time of the invention to combine the teachings of *Morrison* with the teachings of *Rhoads* and *Kramer*.

5. Conclusion – TSM Test.

Although the recent *KSR* Supreme Court case has indicated that the teaching-suggestion-motivation (TSM) test is not a rigid test, it is still considered to be a factor. Under this test, there must be some type of teaching in each of the references for combination as well as some kind of suggestion. There also must be some motivation to combine the three references. If this test alone is utilized, the question would be whether there is any teaching in *Rhoads*, *Kramer* and *Morrison* that would suggest to one skilled in the art to combine the three references or is there any motivation to so combine.

Rhoads is a reference that provides a system that allows a user the ability to use an optical sensor to interface with computers. The use of the optical sensor in association with steganographically embedded information in an object enables every day objects to communicate ideas and functions to the computer. The data encoded in objects is such that it only sends rudimentary commands to the computer, such as linking to a location. However, there is no returning of personal information *in response to a step of extracting* information from a Machine Readable Code (MRC). As such, *Rhoads* only discloses the MRC data that, upon the extraction thereof, instructs a computer to perform specific functions, which MRC data may be operable merely to link the computer to a specified location on the network. *Rhoads* contains no suggestion, teaching or motivation for returning personal information containing links related to vendors that previously had been commercially related with the user for the purpose of completing a commercial transaction using the connection to the credit card server to add purchases to the user account could be useful for its intended purpose.

Kramer is a reference directed toward the concept of placing content in structured electronic documents. The content can be hyperlinks associated with vendors on a credit card statement sent to the user by the credit card company. *Kramer* creates a user profile based on user's past purchases, current online activity, and demographics. *Kramer* specifically teaches that the inserted content is based on the user profile. Additionally, *Kramer* teaches that the local

content is inserted in response to the user enabling the system to illuminate the document. The claims require that the personal information from the credit card company, containing links related to vendors previously related commercially with the user, is returned *in response to the step of extracting* MRC data. The claims further require that the link to the credit card server is used to complete a commercial transaction with a selected vendor and add the purchases to the associated account of the user. *Kramer* contains no teaching therein for linking to the credit card server and completing a financial transaction, using the link to the credit card server, with a selected vendor wherein purchases are added to the associated account of the user.

Morrison is a reference that is a promotion by a credit card company to encourage consumer confidence with regard to online shopping. The credit card web site contains links to merchants. However, these are only links. *Morrison* contains no disclosure that the link to the credit card server is maintained and later utilized for the financial transaction. Therefore, *Morrison* contains no teaching therein for returning personal information of a user in response to extracting information from an MRC contained on a credit card; including links related to vendors previously commercially related to the user; then completing a financial transaction with a selected vendor, utilizing a link to a credit card server, wherein the purchases are added to the user's associated credit card account.

Therefore, no reason, motivation or suggestion exists to combine *Rhoads* with *Kramer* and *Morrison*. *Rhoads* has no need to links to vendors in the systems of *Kramer* and *Morrison*, as the *Rhoads* system provides control of a computer using everyday objects that would, in and of themselves, provide the link. Since the vendor content in *Kramer* and *Morrison* constitutes only links that can redirect an individual to a vendor location, in the same way as an encoded vendor object in the system of *Rhoads*, the question is "Why would one skilled in the art want to use links to vendor in personal account information of a user for a system designed to enable a user to link to a vendor location using an everyday object?" The answer is that there is no such motivation. As such, there is no motivation or suggestion that would in any way lead one skilled in the art to combine such.

Thus, the *Kramer* and *Morrison* references fail to cure the deficiencies in *Rhoads* in that there is no disclosure of, in response to extracting information from an MRC on a credit card;

returning user information containing links related to vendors that had previously been commercially related to the user; providing a hyperlink to a web site of the vendor in the personal account information for automatic connection of the user location to the vendor web site in response to a selection thereof; and completing a financial transaction with the selected vendor in the selection operation to make a purchase, and utilizing the connection to the credit card server to add purchases to the credit card account associated to the credit card of the user.

Based on the TSM test, the Examiner's position is conclusory. The Examiner previously stated that one of ordinary skill in the art at the time the invention was made would "include in Rhoads accessing a credit card company directly to obtain the credit card information [from Kramer] because this would provide a direct access and save the user time by stream lining the system [and] including in Rhoads, the routing information [of Kramer] relating to vendors that previously had been commercially related with the user . . . because this would provide marketing opportunities for vendors and thus create a stream of income thus boosting profits."²⁰¹ However, the Examiner did not offer any reasoning in either reference to suggest such a combination. Appellants stated in a previous response that just because incorporation of such a feature would save the user time by streamlining the system does not provide any suggestion that one skilled in the art would combine these two references and associate the credit card location with the MRC for that purpose.²⁰²

The Examiner now states that one of ordinary skill in the art at the time the invention was made would "include in Rhoads routing information relating to vendors that previously had been commercially related with the user [of Kramer] because [this] would provide a safe platform from which to launch *secure online purchasing and create a comfort level* for the user, thus increasing usage and sales . . . [as well as including] in Rhoads/Kramer conducting transaction from the credit card company web site, because this would *provide greater security and increase the comfort level* of people shopping on the internet, thus increasing revenue."²⁰³ However, the Examiner provides no articulated reasoning "how" the combination of *Rhoads* and *Kramer* would provide a safe platform from which to launch secure online purchasing and create a

²⁰¹ See Final Office Action mailed March 28, 2005, pages 4 and 5.

²⁰² See Response dated September 27, 2005, page 10.

²⁰³ See Final Office Action mailed September 22, 2006, page 4 (emphasis added).

comfort level for the user. Additionally, the Examiner provides no articulated teaching “how” or “why” one of ordinary skill in the art would include conducting a transaction from the credit card company web site with the teachings of *Rhoads* and *Kramer* and the advertisement of *Morrison* in front of them.

The Examiner states that the combination of *Rhoads*, *Kramer* and *Morrison* would “return personal account information from the credit card company server to the user location in response to extracting information from an MRC on a credit card, which returned personal account information contains routing information relating to vendors that previously had been commercially related with the user; providing a hyperlink to a web site of a vendor in the personal account information for automatic connection of the user location to the vendor web site in response to the selection thereof by the user in a selection operation; and completing a financial transaction with the selected vendor in the selection operation to make a purchase, and utilizing the connection to the credit card server made in the step of connecting the user location to the credit card company to add purchases to the credit card account associated with the credit card of the user.” However, the Examiner has provided no articulated teaching how this combination would provide routing information to vendors that had previously been commercially related to the user and complete a financial transaction with a selected vendor wherein the link to the credit card server is used to add purchases to the credit card account associated with the credit card of the user.”²⁰⁴ None of these references, taken singularly or in combination, disclose returning personal account information *in response to extracting* information from an MRC on a credit card, where the personal account information contains routing information to vendors that had previously been commercially related to the user; completing a financial transaction with a selected vendor; and *utilizing the connection to a credit card server to add purchases to the credit card account* associated with the credit card of the user. Furthermore, the Examiner offers the exact same rationale for the combination of *Rhoads* and *Kramer* and the combination of *Rhoads*, *Kramer* and *Morrison*. Accordingly, one of ordinary skill in the art would first combine *Rhoads* and *Kramer* to provide a safe platform from which to launch secure online purchasing and create a comfort level for the user; then combine

²⁰⁴ *KSR*, 127 S. Ct. at page 1741 citing *Kahn*.

Rhoads/Kramer with *Morrison* to provide greater security and increase the comfort level of people shopping on the internet.

6. **KSR Test:**

The recent *KSR* case, although not fully analyzed as to its impact on obviousness type rejections under 35 U.S.C. § 103, seems to indicate that the test is that “if a person of ordinary skill can not implement a *predictable variation*, §103 likely bars it’s patentability.”²⁰⁵ The question would be whether *Rhoads* could be varied in a predictable manner under this dicta to return personal account information, in response to extracting information from an MRC on a credit card, wherein the personal account information contains routing information related to vendors that had previously been commercially related with the user such that upon selecting a link related to a vendor, a financial transaction can be completed, and by utilizing a link to a credit card server, purchases are added to the credit card account associated with the credit card of the user. *Rhoads* would receive no benefit in illuminating personal account information with links to other locations. In Claim 1, the purpose of the routing information in the personal account information is to provide a hyperlink to automatically connect a user to a web site of the vendor when the selection by a user so that the user may, while still linked to the credit card server, complete a financial transaction with the vendor and add the purchases to their credit card account. If the illumination information were used in the *Rhoads* system, there is no indication that the illumination information could provide a link to a vendor for conducting a financial transaction and utilize a link to the credit card company to add purchases to the credit card account of a user. As such, there is no predictable variation of *Rhoads* that would lead one skilled in the art to utilize the *Kramer* illumination or *Morrison* links to merchants. When work is available in one field of endeavor, i.e., providing links to vendors for online commerce, there is no design incentive or other market force that would prompt a predictable variation of the *Rhoads* reference to utilize illumination content for a purpose that is not useful or envisioned in *Rhoads*. In summary, Appellants submit that the Examiner has failed to provide a *prima facie* case as to why the *Rhoads*, *Kramer* and *Morrison* references, in combination, obviate Appellants’ present inventive concept, as defined by claims 1-5, 7-15 and 17-30.

²⁰⁵ *KSR*, 127 S. Ct. at page 1740.

D. Dependent Claims 2-5 and 7-10 as rejected by the combination of *Rhoads, Kramer and Morrison*.

Claims 2-5, 7-15 and 17-30 depend from and further limit Claim 1. These dependent claims are allowable for at least the same reasons as the claim from which they depend, as discussed above.

E. Independent Claim 11 as rejected by the combination of *Rhoads, Kramer and Morrison*.

Independent Claim 11 is directed to a system for accessing a vendor web site on a network using personal credit card account information retrieved from a credit card server disposed on the network. The system comprises a machine-resolvable code (MRC) on a credit card of a user issued to the user by the credit card company, wherein said MRC is read with a reading device at a user location of said user, said user location disposed on the network, and coded information of said MRC extracted therefrom; routing information associated with said coded information, which said *routing information corresponds to the personal account information of said user stored on the credit card company server*; wherein the user location is connected to the credit card company server across the network via a credit card company connection *in response to the reading of the MRC* in accordance with said routing information, and the personal account information returned from the credit card company server to said user location is presented to said user at said user location, which returned personal account information *contains as a portion thereof routing information relating to vendors that previously had been commercially related with the user*; a hyperlink to a web site of a vendor provided in association with the personal account information for automatically connecting said user location to said web site in response to the selection thereof by the user; and *wherein a user can complete a financial transaction with the hyperlinked vendor to make a purchase and use the credit card company connection to the credit card server to add purchases to the credit card account associated with the credit card*.

Independent Claim 11 contains limitations directed toward “in response to extracting information from an MRC on a credit card, returning personal account information containing routing information relating to vendors that previously had been commercially related with the user” as found in Claim 1. Also as found in Claim 1, independent Claim 11 additionally contains

the limitation “wherein a user can complete a financial transaction with the hyperlinked vendor to make a purchase and use the credit card company connection to the credit card server to add purchases to the credit card account associated with the credit card.” Therefore, Independent Claim 11 is allowable for at least the same reasons as Claim 1, as discussed above.

F. Dependent Claims 12-15 and 17-20 as rejected by the combination of *Rhoads, Kramer and Morrison*.

Claims 12-15 and 17-20 depend from and further limit Claim 11. These dependent claims are allowable for at least the same reasons as the claim from which they depend, as discussed above.

G. Dependent Claims 6 and 16 as rejected by the combination of *Rhoads, Kramer, Morrison and Official Notice*.

In the Final Office Action mailed September 22, 2006, the Examiner maintains his 35 U.S.C. § 103 rejection of Claims 6 and 16 as being unpatentable over the combination of *Rhoads, Kramer, Morrison and Official Notice*. On pages 3 and 4 of the Final Office Action, the Examiner states:

Rhoads teaches the use of a scanner, but does not specifically mention that the scanner is wireless. It was old and well known in the art at the time of the invention to use wireless scanners to input information to a user computer. It would have been obvious to a person having ordinary skill in the art at the time of the invention to include in Rhoads the use of a wireless scanner, because this would provide mobility and allow a person to scan a heavy object the (*sic*) is away from the person computer, thus providing more efficiency to the system.²⁰⁶

Although a wireless scanner may have been known in the art, utilizing such a scanner as would be required by the combination would not be obvious. Providing a wireless scanner to scan products does not necessarily mean that this wireless sensor would be utilized in the combination.²⁰⁷ *Rhoads* is directed to providing an optical scanner to interact with encoded objects so that the *objects* can direct computer action in a fashion similar to other input devices. *Rhoads* teaches specifically that the *object can be manipulated*, i.e., rotated, to add further

²⁰⁶ See Final Office Action mailed September 22, 2006, page 13.

²⁰⁷ See Response dated July 17, 2006, page 11.

commands to the computer.²⁰⁸ Neither *Kramer* nor *Morrison* contemplates the use of a scanner. *Kramer* is directed towards illuminating structured electronic documents while *Morrison* is an advertisement illustrating links to vendor sites. Therefore, *Rhoads*, *Kramer* and *Morrison*, singularly or in combination, do not contain a teaching, suggestion or motivation to use a wireless scanner.

The system of dependent Claims 6 and 16 require the use of a wireless scanner to scan an MRC on a credit card. The scanner attaches to a computer system operable to connect the user to a vendor location via a credit card server through scanning the MRC on the credit card. The Examiner has identified a particular component, that of a wireless scanner, and combined it as required by Appellants' claims and declared that one of ordinary skill in the art would have combined the wireless scanner with the system as described by the instant application to scan the MRC on a credit card, as required by the claims of the instant application, because a wireless scanner would have made the system more efficient to scan a heavy object. However, one skilled in the scanner arts, with the teachings of *Rhoads*, *Kramer* and *Morrison* in front of them, would not be motivated to use a wireless scanner to scan an MRC on a credit card. Thus, the Examiner's position is conclusory. In summary, Appellants submit that the Examiner has failed to provide a *prima facie* case as to why the *Rhoads*, *Kramer* and *Morrison* references, in combination with an *Official Notice*, obviate Appellant's present inventive concept, as defined by Claims 6 and 16.

H. Independent Claim 21 as rejected by the combination of *Rhoads*, *Kramer* and *Morrison*.

In the Final Office Action mailed September 22, 2006, the Examiner maintains his 35 U.S.C. § 103 rejection of Claims 21-30 as being unpatentable over the combination of *Rhoads*, *Kramer* and *Morrison*. On page 13 of the Final Office Action, the Examiner states:

In regards to claim 21, Rhoads discloses a method for connecting to a remote provider location on a network from a user location thereon comprising the steps of;

²⁰⁸ See *Rhoads*, Col. 1, lines 38-41.

inputting a unique commerce code at the user location, wherein the unique commerce code is associated with commercial transactions of the user of the unique commerce code;

in response to the step of inputting, displaying to the user correlating historical commercial transaction information associated with the unique commerce code, which displayed correlating historical commercial transaction information has associated therewith corresponding routing information over the network to other locations on the network,

at least one of which is the remote commerce provider's location on the network;

allowing the user the option of selecting the routing information to the remote commerce provider's location on the network; and

in response to the user selecting, connecting of the user location to the remote commerce provider's location (see response to claim 1).²⁰⁹

Independent Claim 21 is directed to, in the preamble, a method for connecting to a remote provider location on a network from a user location. The method of Claim 21 requires the inputting of a unique commerce code at the user location, wherein the unique commerce code is associated with commercial transactions of a user of the unique commerce.

As previously stated, *Rhoads* discloses scanning a code embedded as part of an object in order to allow the object to control a computer. *Rhoads* teaches that objects can be steganographically encoded with a code that the code is imperceptible to the human eye. The object, in *Rhoads*, once steganographically encoded with the code, can be used to issue commands to a computer. *Rhoads* does not contain a teaching, suggestion or motivation that the embedded code is a unique commerce code that is associated with commercial transactions of a user.

Additionally, Claim 21 requires, in response to the step of inputting, displaying to the user correlating historical commercial transaction information associated with the unique commerce code, which displayed correlating historical commercial transaction information has associated therewith corresponding routing information over the network to other locations on the network, at least one of which is the remote commerce providers location on the network.

²⁰⁹ See Final Office Action mailed September 22, 2006, page 13.

Not only does *Rhoads* not teach a unique commerce code, *Rhoads* does not teach that a user's correlating historical transaction information is displayed. Further, *Rhoads* does not teach that information is returned with routing information to other locations on the network.

The claim also requires allowing the user the option of selecting the routing information to the remote provider's location on the network; in response to the user selecting, connecting the user location to the remote commerce provider's location; and completing a financial transaction with the remote commerce provider's location to which the user is connected to make a purchase, and updating the historical commercial transaction information associated with the unique commerce code by the financial entity and adding commercial transactions thereto. Since *Rhoads* does not teach or suggest a unique code and correlating historical transaction information with associated routing information to other locations on the network, *Rhoads* does not teach that a user could select the routing information to connect to a remote commerce provider and complete a financial transaction with the remote commerce provider and updating the historical commercial transaction information associated with the unique commerce code and adding the commercial transactions thereto.

The Examiner has provided *Kramer* and *Morrison* to cure the deficiencies of *Rhoads*. As stated hereinabove, *Kramer* and *Morrison* do not contain a teaching, suggestion or motivation to support such a combination. Further, even if combined, the addition of *Kramer* and *Morrison* does not teach a unique commerce code associated with commercial transaction of a user. Therefore, the addition of *Kramer* and *Morrison* does not teach that the inputting of the unique commerce code would result in the display of correlating historical commercial transaction information with associated routing information to a remote provider's location. Finally, the addition of *Kramer* and *Morrison* does not teach that a user may connect to a remote provider location, using the routing information in the correlating historical commercial transaction information, and complete a financial transaction wherein the commercial transactions are added to the historical commercial transaction information associated with the unique code.

The combination of *Rhoads*, *Kramer* and *Morrison* fails to teach every limitation required by Claim 21. As such, the Examiner has failed to provide a prima facie case as to why

the combination of *Rhoads*, *Kramer* and *Morrison* obviate Appellant's present inventive concept, as defined by Claims 22-30.

I. Dependent Claims 22-30 as rejected by the combination of *Rhoads*, *Kramer* and *Morrison*.

Claims 22-30 depend from and further limit Claim 21. These dependent claims are allowable for at least the same reasons as the claim from which they depend, as discussed above.

J. Independent Claim 31 as rejected by the combination of *Rhoads*, *Kramer* and *Morrison*.

In the Final Office Action mailed September 22, 2006, the Examiner maintains his 35 U.S.C. § 103 rejection of Claims 31-40 as being unpatentable over the combination of *Rhoads*, *Kramer* and *Morrison*. On page 13 of the Final Office Action, the Examiner states:

Applicant regards these claims as “mirroring” (parallel claims) those claims previously prosecuted in claims 1-30. Since these claims are considered to be parallel claims they are rejected for the same rational (*sic*) as that stated above.²¹⁰

In the preamble, independent Claim 31 is directed to a method for connecting to a remote provider location on a network from a user location thereon for the purpose of completing a transaction therewith. The method of Claim 31 requires the inputting of a unique commerce code at the user location, wherein the unique commerce code is *uniquely associated* with commercial transactions of a *unique user* of the unique commerce code, and which unique commerce code is issued to the user by financial entity that monitors financial transactions of users.

Claim 31 has limitations as found in Claims 1, 11 and 21. As such, Claim 31 is allowable for at least the same reasons as Claims 1, 11 and 21. However, Claim 31 is not a parallel claim of Claims 1, 11 and 21. Claim 31 requires that the unique commerce code is *uniquely associated* with commercial transactions of a *unique user*. As previously stated, *Rhoads* does not contain a teaching, suggestion or motivation that the embedded code is a unique commerce code.

²¹⁰ See Final Office Action mailed September 22, 2006, page 13.

Therefore, *Rhoads* also does not contain a teaching for a unique commerce code that is uniquely associated with commercial transactions of a unique user.

As noted above, the addition of *Kramer* and *Morrison* does not cure the deficiencies of *Rhoads*. The combination of *Rhoads*, *Kramer* and *Morrison* fails to teach every limitation required by Claim 31. As such, the Examiner has failed to provide a prima facie case as to why the combination of *Rhoads*, *Kramer* and *Morrison* obviate Appellant's present inventive concept, as defined by Claims 31-40.

K. Dependent Claims 32-40 as rejected by the combination of *Rhoads*, *Kramer* and *Morrison*.

Claims 32-40 depend from and further limit Claim 31. These dependent claims are allowable for at least the same reasons as the claim from which they depend, as discussed above.

VIII. Conclusion

In Summary, these references fail to provide a suggestion, motivation, or teaching for the combinations because the text fails to illustrate “why” one skilled in the art would combine the references in the particular manner required nor do these references, in combination, suggest that one skilled in the art could implement a predictable variation of these references so as to arrive at an obviating combination. Instead, the Examiner simply identifies particular components for each reference, combines them in a specific manner required by Appellant’s claimed invention, and then states that it would be obvious to one skilled in the art to do so. This is clearly hindsight based reasoning that contravenes the standards imposed by both the MPEP and the Federal Circuit. Appellant respectfully submits that the cited combinations are improper for the reasons detailed above and requests the rejections under § 103 be withdrawn.

Respectfully submitted,

HOWISON & ARNOTT, L.L.P.

/Gregory M. Howison, Reg. # 30,646/

Gregory M. Howison
ATTORNEYS FOR THE APPELLANTS
P.O. Box 741715
Dallas, TX 75374-1715
October 19, 2007

CLAIMS APPENDIX

1. A method of accessing a vendor web site disposed on a network at the vendor location thereon using personal account information of a user retrieved from a credit card company server disposed on the network at a credit card location thereon, comprising the steps of:

at a user location disposed on the network, reading a machine-resolvable code (MRC) on a credit card of the user with a reading device, which credit card was issued by the credit card company;

extracting coded information from the MRC;

obtaining routing information associated with the coded information, which routing information corresponds to the personal account information of the user stored on the credit card company server disposed on the network;

connecting the user location to the credit card company server across the network in accordance with the routing information;

returning the personal account information from the credit card company server to the user location in response to the step of extracting, which returned personal account information contains routing information relating to vendors that previously had been commercially related with the user;

presenting the personal account information to the user at the user location;

providing a hyperlink to a web site of a vendor in the personal account information for automatic connection of the user location to the vendor web site in response to the selection thereof by a user in a selection operation; and

completing a financial transaction with the selected vendor in the selection operation to make a purchase, and utilizing the connection to the credit card server made in the step of connecting the user location to the credit card company to add purchases to the credit card account associated with the credit card of the user.

2. The method of Claim 1, wherein the MRC is optical indicia.

3. The method of Claim 2, wherein the optical indicia is a bar code.

4. The method of Claim 1, wherein the routing information in the step of obtaining is stored on a user computer at the user location such that the coded information in the step of extracting is used to obtain the corresponding routing information from the user computer.

5. The method of Claim 4, wherein the user computer stores a plurality of coded information each associated with unique routing information such that reading of the MRC of a select one of one or more credit cards of the user causes the user computer to connect to the corresponding credit card company server over the network.

6. The method of Claim 1, wherein the reading device is a wireless scanner which transmits the coded information to a user computer at the user location via a receiving device operatively connected to the user computer.

7. The method of Claim 1, wherein personal account information in the step of presenting is displayed on a computer display operatively connected to a user computer at the user location.

8. The method of Claim 1, wherein the routing information in the step of obtaining comprises a network address of the credit card company server on the network and file path information which locates the personal account information of the user on the credit card company server.

9. The method of Claim 1, wherein the hyperlink is associated with a line item transaction of the personal account information such that the purchased product associated with the line item transaction is a select one of one or more products of the vendor of the web site which are available for purchase.

10. The method of Claim 1, wherein the hyperlink is associated with a line item transaction of the personal account information such that the purchased product associated with the line item transaction is unrelated to product information of one or more products of the vendor of the web site which are available for purchase and to which the hyperlink is associated.

11. A system of accessing a vendor web site on a network using personal credit card account information retrieved from a credit card company server disposed on the network, comprising:

a machine-resolvable code (MRC) on a credit card of a user issued to the user by the credit card company, wherein said MRC is read with a reading device at a user location of said user, said user location disposed on the network, and coded information of said MRC extracted therefrom;

routing information associated with said coded information, which said routing information corresponds to the personal account information of said user stored on the credit card company server;

wherein the user location is connected to the credit card company server across the network via a credit card company connection in response to the reading of the MRC in accordance with said routing information, and the personal account information returned from the credit card company server to said user location is presented to said user at said user location, which returned personal account information contains as a portion thereof routing information relating to vendors that previously had been commercially related with by the user; and

a hyperlink to a web site of a vendor provided in association with the personal account information for automatically connecting said user location to said web site in response to the selection thereof by the user;

wherein a user can complete a financial transaction with the hyperlinked vendor to make a purchase and use the credit card company connection to the credit card server to add purchases to the credit card account associated with the credit card.

12. The system of Claim 11, wherein said MRC is optical indicia.

13. The system of Claim 12, wherein said optical indicia is a bar code.

14. The system of Claim 11, wherein said routing information is stored on a user computer at said user location such that said coded information is used to obtain the corresponding said routing information from said user computer.

15. The system of Claim 14, wherein said user computer stores a plurality of said coded information each associated with unique said routing information such that reading of said MRC of a select one of the one or more credit cards of said user causes said user computer to connect to the corresponding credit card company server over the network.

16. The system of Claim 11, wherein said reading device is a wireless scanner which transmits said coded information to a user computer via a receiving device operatively connected to said user computer.

17. The system of Claim 11, wherein personal account information is displayed on a computer display operatively connected to a user computer at said user location.

18. The system of Claim 11, wherein said routing information comprises a network address of the credit card company server on the network and file path information which locates the personal account information of said user on the credit card company server.

19. The system of Claim 11, wherein said hyperlink is associated with a line item transaction of the personal account information such that said purchased product associated with said line item transaction is a product available for purchase from said vendor web site.

20. The system of Claim 11, wherein said hyperlink is associated with a line item transaction of the personal account information such that said purchased product associated with said line item transaction is unrelated to product information of one or more products of said vendor of the web site which are available for purchase and to which said hyperlink is associated.

21. A method for connecting to a remote provider location on a network from a user location thereon comprising the steps of:

- inputting a unique commerce code at the user location, wherein the unique commerce code is associated with commercial transactions of the user of the unique commerce code;

- in response to the step of inputting, displaying to the user correlating historical commercial transaction information associated with the unique commerce code, which displayed correlating historical commercial transaction information has associated therewith corresponding routing information over the network to other locations on the network, at least one of which is the remote commerce provider's location on the network;

- allowing the user the option of selecting the routing information to the remote commerce provider's location on the network;

- selecting by the user the routing information to the remote provider's location on the network;

- in response to the user selecting, connecting the user location to the remote commerce provider's location; and

- completing a financial transaction with the remote commerce provider's location to which the user is connected to make a purchase, and updating the historical commercial transaction information associated with the unique commerce code and adding commercial transactions thereto.

22. The method of Claim 21, wherein the step of displaying in response to the step of inputting comprises the steps of:

connecting to a commerce transaction location on the network that is associated with the unique commerce code in the step of inputting;

the commerce transaction location having associated therewith a relational database with a plurality of information blocks of commercial transaction information associated with at least a portion of each of a plurality of unique commerce codes; and

comparing the received at least a portion of the unique commerce code with the database and, if a match exists, returning the associated information block of commercial transaction information to the user.

23. The method of Claim 22, wherein the returned information block is unique to the at least a portion of the unique commerce code transmitted thereto.

24. The method of Claim 23, wherein the unique commerce code is comprised of a first portion that is associated with routing information to the commercial transaction location on the network and a second portion that is related to the associated information block of commercial transaction information in the database, the second portion corresponding to the at least one portion.

25. The method of Claim 22, wherein the step of connecting comprises the steps of:

routing at least a portion of the unique commerce code to an intermediate location on the network, the intermediate location containing a database with relational information between a plurality of the at least portion of the unique commerce codes to network addresses of commercial transaction locations on the network;

comparing the received at least portion of the unique commerce code with information in the database; and

if a match exists, returning the routing information to the commercial transaction location on the network and connecting thereto.

26. The method of Claim 25, wherein the unique commerce code has a first portion that is stored in the database associated with the intermediate location on the network for determining the location of the commercial transaction location network and a second portion associated with the database at the commercial transaction location on the network for determining the information to be returned to the user.

27. The method of Claim 21, wherein the unique commerce code is disposed on a substrate and the step of inputting comprises reading the unique commerce code disposed on the substrate.

28. The method of Claim 27, wherein the step of reading the unique commerce code comprises using a bar code reader.

29. The method of Claim 27, wherein the substrate comprises a credit card.

30. The method of Claim 29, wherein the credit card, in addition to having the unique commerce code associated therewith, has additional identification information for the purposes of utilizing the credit card in a commercial transaction outside of the step of inputting.

31. A method for connecting to a remote provider location on a network from a user location thereon for the purpose of completing a transaction therewith, comprising the steps of:

inputting a unique commerce code at the user location, wherein the unique commerce code is uniquely associated with commercial transactions of a unique user of the unique commerce code, and which unique commerce code is issued to the user by financial entity that monitors financial transactions of users;

in response to the step of inputting, displaying to the user correlating historical commercial transaction information associated with the unique commerce code by the financial entity, which displayed correlating historical commercial transaction information has associated therewith corresponding routing information over the network to other locations on the network, at least one of which is the remote commerce provider's location on the network;

allowing the user the option of selecting the routing information to the remote commerce provider's location on the network;

selecting by the user the routing information to the remote provider's location on the network;

in response to the user selecting, connecting the user location to the remote commerce provider's location; and

completing a financial transaction with the remote commerce provider's location to which the user is connected to make a purchase, and updating the historical commercial transaction information associated with the unique commerce code by the financial entity and adding commercial transactions thereto.

32. The method of Claim 31, wherein the step of displaying in response to the step of inputting comprises the steps of:

connecting to a commerce transaction location associated with the financial entity and controlled thereby on the network that is associated with the unique commerce code in the step of inputting;

the commerce transaction location having associated therewith a relational database with a plurality of information blocks of commercial transaction information associated with at least a portion of each of a plurality of unique commerce codes; and

comparing the received at least a portion of the unique commerce code with the database and, if a match exists, returning the associated information block of commercial transaction information to the user.

33. The method of Claim 32, wherein the returned information block is unique to the at least a portion of the unique commerce code transmitted thereto.

34. The method of Claim 33, wherein the unique commerce code is comprised of a first portion that is associated with routing information to the commercial transaction location on the network and a second portion that is related to the associated information block of commercial transaction information in the database, the second portion corresponding to the at least one portion.

35. The method of Claim 32, wherein the step of connecting comprises the steps of:

routing at least a portion of the unique commerce code to an intermediate location on the network controlled by the financial entity, the intermediate location containing a database with relational information between a plurality of the at least portion of the unique commerce codes to network addresses of commercial transaction locations on the network;

comparing the received at least portion of the unique commerce code with information in the database; and

if a match exists, returning the routing information to the commercial transaction location on the network and connecting thereto.

36. The method of Claim 35, wherein the unique commerce code has a first portion that is stored in the database associated with the intermediate location on the network for determining the location of the commercial transaction location network and a second portion associated with the database at the commercial transaction location on the network for determining the information to be returned to the user.

37. The method of Claim 31, wherein the unique commerce code is disposed on a substrate and the step of inputting comprises reading the unique commerce code disposed on the substrate, which substrate is issued to the use by the financial entity.

38. The method of Claim 37, wherein the step of reading the unique commerce code comprises using a bar code reader.

39. The method of Claim 37, wherein the substrate comprises a credit card and wherein the financial entity comprises a credit card company.

40. The method of Claim 39, wherein the credit card, in addition to having the unique commerce code associated therewith, has additional identification information for the purposes of utilizing the credit card in a commercial transaction outside of the step of inputting.

EVIDENCE APPENDIX

- A. U.S. Patent No. 6,311,214 to *Rhoads*. found on page 3 of the Office Action (dated November 17, 2003), found on pages 4 and 6-15 of the Office Action (dated May 7, 2004), found on pages 3 -15 of the Office Action (dated March 28, 2005), found on pages 3-14 of the Office Action (dated January 23, 2006), and found on pages 3-13 of the Final Office Action (dated September 22, 2006).
- B. U.S. Patent No. 6,327,574 to *Kramer et al* ("Kramer") found on page 5 of the Office Action (dated May 7, 2004), found on pages 3-5, 7 and 13-15 of the Final Office Action (dated March 28, 2005), found on pages 3-6 13 of the Office Action (dated January 23, 2006), and found on pages 3-4, 6, and 12 of the Final Office Action (dated September 22, 2006).
- C. Non Patent Literature (NPL see 892) to *Morrison* found on pages 3, 5 and 14 of the Office Action (dated January 23, 2006), and found on pages 3-4 and 12 of the Final Office Action (dated September 22, 2006).
- D. *Alza Corporation v. Mylan Laboratories, Inc.*, 464 F.3d 1286 (Fed. Cir. 2006)
- E. *Anderson's-Black Rock, Inc. v. Pavement Salvage Co.*, 396 U.S. 57 (1969)
- F. *Cable Elec. Prods., Inc. v. Genmark, Inc.*, 770 F.2d 1031 (Fed. Cir. 1985)
- G. *Cross Medical Products, Inc. v. Metronics Sofamore Danek, Inc.*, 424 F.3d 1293, 1323 (Fed. Cir. 2005)
- H. *Dann v. Johnston*, 425 U.S. at 219, 226, 96 S.Ct. 1393, 47 L.Ed 2d 692 (1976)
- I. *In re Bond*, 910 F.2d, 831, (Fed. Cir. 1990)
- J. *In re Clinton*, 527 F.2d 1226 (C.C.P.A. 1976)
- K. *In re Dembiczak*, 175 F.3d 994, 998 (Fed. Cir. 1999)
- L. *In re Hiraro*, 535 F.2d, 67, (C.C.P.A. 1966)
- M. *In re Kahn*, 441 F.3d 977, 985 (Fed. Cir. 2006)
- N. *In re Regel*, 526 F.2d, 1399 (C.C.P.A. 1975)
- O. *In re Rouffett*, 149 F.3d 1350, 1357
- P. *KSR International Co. v. Teleflex Inc, et al.*, 127 S. Ct. 1727 (2007)
- Q. *Medichem S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1165 (Fed. Cir 2006)
- R. *Sakraida v. AGPro, Inc.*, 425 U.S. 273 (1976)
- S. *United States v. Adams*, 383 U.S. 39, 40 (1966)



US006311214B1

(12) **United States Patent**
Rhoads(10) **Patent No.:** **US 6,311,214 B1**(45) **Date of Patent:** ***Oct. 30, 2001**(54) **LINKING OF COMPUTERS BASED ON
OPTICAL SENSING OF DIGITAL DATA**(75) Inventor: **Geoffrey B. Rhoads**, West Linn, OR
(US)(73) Assignee: **Digimarc Corporation**, Tualatin, OR
(US)(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 0 days.This patent is subject to a terminal dis-
claimer.(21) Appl. No.: **09/342,689**(22) Filed: **Jun. 29, 1999****Related U.S. Application Data**

- (63) Continuation-in-part of application No. 09/130,624, filed on
Aug. 6, 1998, which is a continuation of application No.
08/508,083, filed on Jul. 27, 1995, now Pat. No. 5,841,978,
and a continuation-in-part of application No. 09/314,648,
filed on May 19, 1999, which is a continuation-in-part of
application No. 09/292,569, filed on Apr. 15, 1999.
- (60) Provisional application No. 60/134,782, filed on May 19,
1999.

- (51) Int. Cl.⁷ **G06F 13/00**
(52) U.S. Cl. **709/217; 709/313; 380/4**
(58) Field of Search 709/217, 219,
709/227, 230, 250, 313, 328, 329; 380/4,
9, 49

(56) **References Cited****U.S. PATENT DOCUMENTS**

4,947,028 8/1990 Gong .

- 5,053,956 10/1991 Donald et al. .
5,262,860 11/1993 Filpatrick et al. .
5,288,976 2/1994 Citron et al. .
5,385,371 1/1995 Izawa .
5,463,209 10/1995 Figh et al. .
5,495,581 2/1996 Tsai .

(List continued on next page.)

FOREIGN PATENT DOCUMENTS

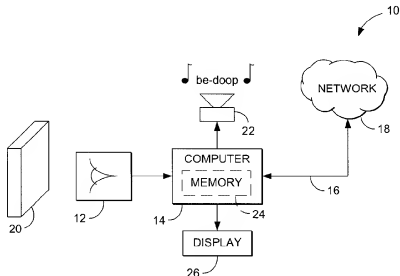
- 0493091 7/1992 (EP) .
WO95/14289 5/1995 (WO) .
WO95/20301 7/1995 (WO) .
WO96/27259 9/1996 (WO) .
WO96/36163 11/1996 (WO) .
WO97/02522 1/1997 (WO) .
WO97/43736 11/1997 (WO) .
WO98/03923 1/1998 (WO) .
WO98/51036 11/1998 (WO) .
WO99/57623 11/1999 (WO) .

OTHER PUBLICATIONSU.S. application No. 60/000,442, Hudetz, filed Jun. 22,
1995.

(List continued on next page.)

Primary Examiner—Viet D. Vu(74) *Attorney, Agent, or Firm*—William Y. Conwell;
Digimarc Corporation(57) **ABSTRACT**

A printed object, such as an item of postal mail, a book,
printed advertising, a business card, product packaging, etc.,
is steganographically encoded with plural-bit data. When
such an object is presented to an optical sensor, the plural-bit
data is decoded and used to establish a link to an internet
address corresponding to that object.

23 Claims, 2 Drawing Sheets

U.S. PATENT DOCUMENTS

5,496,071	3/1996	Walsh .	
5,530,852	6/1996	Menke, Jr. et al. .	
5,613,004	3/1997	Cooperman et al. .	
5,640,193	6/1997	Wellner .	
5,659,164	8/1997	Schmid et al. .	
5,673,316	9/1997	Auerbach et al. .	
5,721,788	2/1998	Powell et al. .	
5,742,845	4/1998	Wagner .	
5,761,606	6/1998	Wolzien .	
5,761,686	6/1998	Bloomberg .	
5,774,064	6/1998	Hiday et al. .	
5,774,666	6/1998	Portuesi .	
5,778,102	7/1998	Sandford, II et al. .	
5,804,803	9/1998	Cragun et al. .	
5,809,317	9/1998	Kogan et al. .	
5,818,441	10/1998	Throckmorton et al. .	
5,822,432	10/1998	Moskowitz et al. .	
5,836,458	11/1998	Tsai .	
5,848,413 *	12/1998	Wolff .	707/10
5,857,038	1/1999	Owada et al. .	
5,872,589	2/1999	Morales .	
5,892,900	4/1999	Gintier et al. .	
5,900,608	5/1999	Iida .	
5,903,729	5/1999	Reber et al. .	
5,905,248 *	5/1999	Russell et al. .	235/462.27
5,913,210	6/1999	Call .	
5,915,027	6/1999	Cox et al. .	
5,918,214	6/1999	Perkowski .	
5,932,863	8/1999	Rathus et al. .	
5,933,829	8/1999	Durst et al. .	
5,938,726	8/1999	Reber et al. .	
5,940,595	8/1999	Reber et al. .	
5,978,773	11/1999	Huetzel et al. .	
5,986,651	11/1999	Reber et al. .	
6,012,102	1/2000	Shachar .	
6,052,486	4/2000	Knowlton et al. .	

6,081,827	6/2000	Reber et al. .
6,098,106	8/2000	Philyaw et al. .
6,108,656	8/2000	Durst et al. .
6,148,331	11/2000	Perry .

OTHER PUBLICATIONS

IBM Technical Disclosure Bulletin 96A 61092, published Jan. 1, 1996.

"Distributing Uniform Resource Locators as Bar Code Images," IBM Technical Disclosure Bulletin, No. 39, No. 1, pp. 167-168, 96A 60059, published Jan. 1, 1996.

Frequently Asked Questions about Digimarc Signature Technology, Aug. 1, 1995, 9 pages.

Barlett, et al., "An Overview of HighWater FBI Technology," Posted on Internet Mar. 22, 1996, 12 pages.

Digimarc presentation at RSA Conference, Jan. 1996, 4 pages.

"Digital Watermarks What Are They?" Digimarc Corporation, 1997.

Seybold Report on Internet Publishing, vol. 1, No. 4, Dec. 1996.

Seybold Report on Publishing Systems, vol. 25, No. 6, 1996.

Bethoney, "A Lasting Way For Artists To Leave Their Mark," PCWeek, Dec. 11, 1996.

Digital Media Monthly, Aug., 1996 (excerpt re Highwater FBI).

Digimarc Press Releases (various), 1996-1998.

Simone, "A Digital Watermark for Images," PC Magazine Dec. 18, 1996.

"Copyright Protection for Digital Images, Digital Fingerprinting from FBI," Highwater FBI brochure, 1995, 4 pages.

"Highwater FBI Limited Presentation, Image Copyright Protection Software," FBI Ltd brochure, Jul. 1995, 17 pages.

* cited by examiner

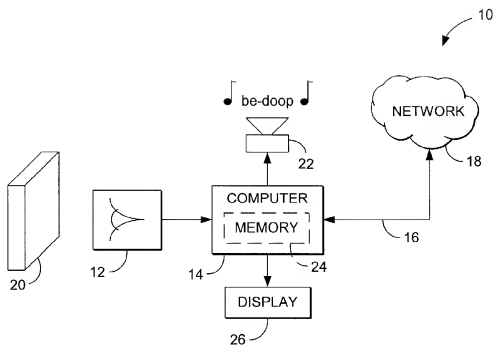


FIG. 1

FIG. 2

1

LINKING OF COMPUTERS BASED ON OPTICAL SENSING OF DIGITAL DATA

RELATED APPLICATION DATA

This application is a continuation-in-part of copending application Ser. No. 09/130,624, filed Aug. 6, 1998, which is a continuation of application Ser. No. 08/508,083 filed on Jul. 27, 1995, (now U.S. Pat. No. 5,841,978). This application is also a continuation-in-part of copending application Ser. No. 09/314,648, filed May 19, 1999 (attached as Appendix A). This application is also a continuation-in-part of copending provisional application 60/134,782, also filed May 19, 1999 (attached as Appendix B). This application is also a continuation-in-part of copending application Ser. No. 09/292,569, filed Apr. 15, 1999, which claims priority to application Ser. No. 60/082,228, filed Apr. 16, 1998.

FIELD OF THE INVENTION

The present invention relates optical user interfaces that sense digitally-encoded objects. The invention further relates to systems using such optical interfaces to control computers, and to navigate over or act as portals on networks.

BACKGROUND AND SUMMARY OF THE INVENTION

"Bedoop." That might be the sound that someone might hear as they lazily place a magazine advertisement in front of their desktop camera. Magically, the marketing and sales web site associated with the ad is displayed on their computer. More information? Want to buy now? Look at the full product line? No problem.

"Bedoop." That might be the same sound when that same someone places their credit card in front of their desktop camera. Instantly, the product displayed on the web page is purchased. Behind the scenes, a secure purchase link is initiated, transmitting all requisite information to the vendor. Twist the credit card clockwise and the purchaser chooses overnight delivery.

So goes an exemplary embodiment of the invention further described in this application. Though this example is rather specific, it nevertheless alludes to an indescribably vast array of applications possible when a digital camera or other optical sensing device is turned into a general purpose user interface device with an intuitive power that very well might rival the mouse and the keyboard.

The centerpiece of the invention is that an object or paper product so-scanned contains digital information that can be quickly read and acted upon by an appropriately configured device, computer or appliance. The preferred embodiment envisions that this digital information is aesthetically hidden on objects. These objects have been previously and proactively marked with the digital information, using any of the broad ranges of printing and processing techniques which are available on the market and which are widely described in the open literature and patent literature surrounding digital watermarking.

Be this as it may, though the invention concentrates on flat object applications wherein the digital information is often imperceptibly integrated into the object, it is certainly not meant to be so limited. Objects can be three dimensional in nature and the information more visually overt and/or pre-existing (i.e., not "pro-actively" embedded, or not even be "digital," per se). Different implementation considerations attach to these variants. Likewise, though the bulk of this

2

disclosure concentrates on objects which have some form of digital message attached thereto, some aspects of the invention may apply to objects which have no such thing, where the prior arts of pattern recognition and gestural input can be borrowed in combination with this invention to effect yet a broader array of applications.

"Bedoop." The sound that a refrigerator might make, outfitted with a simple camera/processor unit/net connection, as the ten year old holds up the empty milk carton and a ping goes out to the local grocery store, adding the item to an accumulating delivery list. The sound that might be heard echoing over and over inside Internet cafes as heretofore computerphobes take their first skeptical steps onto the world wide web. The sound heard at the fast food counter as the repeat customer holds up their sandwich card ticking off their latest meal, hoping for the sirens to go off for a \$500 prize given to the lucky customer of the week. Blue sky scenarios abound.

This invention is therefore about powerful new user interfaces to computers involving optical input. These new user interfaces extend into the everyday world in ways that a mouse and keyboard never could. By enabling everyday objects to communicate their identities and functions to ever-attendant devices, not only will the world wide web be given an entirely new dimension, but basic home and office computing may be in store for some fundamental advances as well.

Well, and a great many other features of the present invention will be more readily apparent from the following detailed description, which proceeds with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram showing one embodiment of the present invention.

FIG. 2 is another block diagram showing an embodiment of the present invention.

DETAILED DESCRIPTION

Basically, the technology detailed in this disclosure may be regarded as enhanced systems by which users can interact with computer-based devices. Their simple nature, and adaptability for use with everyday objects (e.g., milk cartons), makes the disclosed technology well suited for countless applications.

Due to the great range and variety of subject matter detailed in this disclosure, an orderly presentation is difficult to achieve. As will be evident, many of the topical sections presented below are both founded on, and foundational to, other sections. For want of a better rationale, the sections are presented below in a more or less random order. It should be recognized that both the general principles and the particular details from each section find application in other sections as well. To prevent the length of this disclosure from ballooning out of control, the various permutations and combinations of the features of the different sections are not exhaustively detailed. The inventors intend to explicitly teach such combinations/permutations, but practicality requires that the detailed synthesis be left to those who ultimately implement systems in accordance with such teachings.

Basic Principles—Refrigerators and Clutter

Referring to FIG. 1, a basic embodiment 10 of the present invention includes an optical sensor 12, a computer 14, and a network connection 16 to the internet 18. The illustrated optical sensor 12 is a digital camera having a resolution of

3

320 by 200 pixels (color or black and white) that stares out, grabbing frames of image data five times per second and storing same in one or more frame buffers. These frames of image data are analyzed by a computer 14 for the presence of Bedoop data. (Essentially, Bedoop data is any form of digital data encoding recognized by the system 10—data which, in many embodiments, initiates some action.) Once detected, the system responds in accordance with the detected Bedoop data (e.g., by initiating some local action, or by communication with a remote computer, such as over the internet, via an online service such as AOL, or using point-to-point dial-up communications, as with a bulletin board system).

Consider the milk carton example. The artwork on a milk carton can be adapted to convey Bedoop data. In the preferred embodiment, the Bedoop data is steganographically encoded (e.g., digitally watermarked) on the carton. Numerous digital watermarking techniques are known—all of which convey data in a hidden form (i.e., on human inspection, it is not apparent that digitally encoded data is present). Exemplary techniques operate by slightly changing the luminance, or contours, of selected points on artwork or text printed on the carton, or splatter tiny droplets of ink on the carton in a seemingly random pattern. Each of these techniques has the effect of changing the local luminance at areas across the carton—luminance changes that can be detected by the computer 14 and decoded to extract the encoded digital data. In the case of a milk carton, the data may serve to identify the object as, e.g., a half gallon carton of Alpenrose brand skim milk.

The FIG. 1 apparatus can be integrated into the door of a refrigerator and used to compile a shopping list. Milk cartons, and other Bedoop-encoded packaging 20, can be held up the optical sensor. When the computer 14 detects the presence of Bedoop data and successfully decodes same, it issues a confirmation tone ("be-doop") from a speaker or other audio transducer 22. The computer then adds data identifying the just-detected object to a grocery list. This list can be maintained locally (in disk storage, non-volatile RAM 24, or the like in the refrigerator, or elsewhere in the home), or remotely (e.g., at a server located at a user-selected grocery, or elsewhere). In either event, the list is desirably displayed on a display in the user's home (e.g., an LCD screen 26 built into the front of the appliance). Conventional user interface techniques can be employed permitting the user to scroll through the displayed list, delete items as desired, etc.

Periodically, the listed groceries can be purchased and the list cleared. In one embodiment, the list is printed (either at the home or at the grocery), and the user walks the grocery aisles and purchases same in the conventional manner. In another embodiment, the grocer pulls the listed items from the shelves (in response to a user request conveyed by the internet or telephone, or by a gesture as hereafter detailed). Once the list has been pulled, the grocer can alert the user that the groceries are available for pickup (again, e.g., by internet or telephone message), or the grocer can simply deliver the groceries directly to the user's home. Naturally, on-line payment mechanisms can be employed if desired.

Consider a wholly unrelated Bedoop application. An Excel spreadsheet is printed onto paper, and the paper becomes buried in a stack of clutter on an office worker's desk. Months later the spreadsheet again becomes relevant and is dug out of the stack. Changes need to be made to the data, but the file name has long-since been forgotten. The worker simply holds the dug-out page in front of a camera associated with the desktop computer. A moment later, the electronic version of the file appears on the worker's computer display.

4

When the page was originally printed, tiny droplets of ink or toner were distributed across the paper in a pattern so slight as to be essentially un-noticable, but which steganographically encoded the page with a plural-bit binary number (e.g., 64 bits). A database (e.g., maintained by the operating system, the Excel program, the printer driver, etc.) stored part of this number (e.g., 24 bits, termed a Universal Identifier or UID) in association with the path and file name at which the electronic version of the file was stored, the page number within the document, and other useful information (e.g., author of the file, creation date, etc.).

The steganographic encoding of the document, and the updating of the database, can be performed by the software application (e.g., Excel). This option can be selected once by the user and applied thereafter to all printed documents (e.g., by a user selection on an "Options" drop-down menu), or can be presented to the user as part of the Print dialog window and selected (or not) for each print job.

When such a printed page is later presented to the camera, the computer automatically detects the presence of the encoded data on the page, decodes same, consults the database to identify the file name/location/page corresponding to the UID data, and opens the identified file to the correct page (e.g., after launching Excel). This application is one of many "paper as portal" applications of the Bedoop technology.

The foregoing are but two of myriad applications of the technology detailed herein. In the following discussion a great many other applications are disclosed (some groundbreaking, a few gimmicky). However, regardless of the length of the specification, it is possible only to begin to explore a few of the vast ramifications of this technology. A few more details on the basic embodiments described above may be helpful before delving into other applications.

Optics
For any system to decode steganographically encoded data from an object, the image of the object must be adequately focused on the digital camera's CCD (or other) sensor. In a low cost embodiment, the camera has a fixed nominal focal length, e.g., in the range of 6–24 inches (greater or lesser lengths can of course be used). Since the camera is continuously grabbing and analyzing frames of data, the user can move the object towards- or away- from the sensor until the decoder succeeds in decoding the steganographically encoded data and issues a confirming "Bedoop" audio signal.

In more elaborate embodiments, known auto-focusing technology can be employed.

In still other embodiments, the camera (or other sensor) can be equipped with one or more auxiliary fixed-focus lenses that can be selectively used, depending on the particular application. Some such embodiments have a first fixed focused lens that always overlies the sensor, with which one or more auxiliary lenses can be optically cascaded (e.g., by hinge or slide arrangements). Such arrangements are desirable, e.g., when a camera is not a dedicated Bedoop sensor but also performs other imaging tasks. When the camera is to be used for Bedoop, the auxiliary lens is positioned (e.g., flipped into) place, changing the focal length of the first lens (which may by unsuitably long for Bedoop purposes, such as infinity) to an appropriate Bedoop imaging range (such as one foot).

Other lens-switching embodiments do not employ a fixed lens that always overlies the sensor, but instead employ two or more lenses that can be moved into place over the sensor. By selecting different lenses, focal lengths such as infinity, six feet, and one foot can be selected.

5

In all such arrangements, it is desirable (but not essential) that the steganographically-encoded portion of the object being imaged fills a substantial part of the image frame. The object can be of various sizes, e.g., an 10 by 12 inch front panel of a cereal box, or a proof of purchase certificate that is just one inch square. To meet this requirement, small objects will obviously need to be placed closer to the camera than large objects. The optics of the system can be designed, e.g., by selection of suitable aperture sizing and auxiliary lighting (if needed), to properly image objects of various sizes within a range of focal distances.

Some embodiments avoid issues of focal distances and identifying the intended object by constraining the size of the object and/or its placement. An example is a business card reader that is designed for the sole task of imaging business cards. Various such devices are known.

Decoding/Encoding

The analysis of the image data can be accomplished in various known ways. Presently, most steganographic decoding relies on general purpose microprocessors that are programmed by suitable software instructions to perform the necessary analysis. Other arrangements, such as using dedicated hardware, reprogrammable gate arrays, or other techniques, can of course be used.

The steganographic decoding process may entail three steps. In the first, the object is located. In the second, the object's orientation is discerned. In the third, the Bedoop data is extracted from the image data corresponding to the Bedoop object.

The first step, object location, can be assisted by various clues. One is the placement of the object; typically the center of the image field will be a point on the object. The surrounding data can then be analyzed to try and discern the object's boundaries.

Another location technique is slight movement. Although the user will typically try to hold the object still, there will usually be some jitter of the Bedoop object within the image frame (e.g., a few pixels back and forth). Background visual clutter, in contrast, will typically be stationary. Such movement may thus be sensed and used to identify the Bedoop object from within the image data.

Still another object-location clue is object shape. Many Bedoop objects are rectangular in shape (or trapezoidal as viewed by the camera). Straight edge boundaries can thus be used to define an area of likely Bedoop data.

Color is a further object identification clue that may be useful in some contexts.

Yet another object location clue is spatial frequency. In imaging systems with well defined focal zones, undesired visual clutter may be at focal distances that results in blurring. The Bedoop object, in contrast, will be in focus and may be characterized by fine detail. Analyzing the image data for the high frequencies associated with fine detail can be used to distinguish the intended object from others.

Characteristic markings on the object (as discussed below in connection with determining object orientation), can also be sensed and used in locating the object.

Once the Bedoop object has been located within the image data, masking can be applied (if desired) to eliminate image data not corresponding to the intended object.

The second step in the decoding process—determining orientation of the Bedoop data—can likewise be discerned by reference to visual clues. For example, some objects include subliminal graticule data, or other calibration data, steganographically encoded with the Bedoop data to aid in determining orientation. Others can employ overt markings, either placed for that sole purpose (e.g. reference lines or

6

fiducials), or serving another purpose as well (e.g. lines of text), to discern orientation. Edge-detection algorithms can also be employed to deduce the orientation of the object by reference to its edges.

Some embodiments filter the image data at some point in the process to aid in ultimate Bedoop data extraction. One use of such filtering is to mitigate image data artifacts due to the particular optical sensor. For example, CCD arrays have regularly-spaced sensors that sample the optical image at uniformly spaced discrete points. This discrete sampling effects a transformation of the image data, leading to certain image artifacts. An appropriately configured filter can mitigate the effect of these artifacts.

(In some arrangements, the step of determining the orientation can be omitted. Business card readers, for example, produce data that is reliably free of artifacts and is of known scale. Or the encoding of the Bedoop data can be effected in such a way that renders it relatively immune to certain distortion mechanisms. For example, while the presently-preferred encoding arrangement operates on a 2D grid basis, with rows and columns of data points, the encoding can alternatively be done on another basis (e.g., a rotationally-symmetric form of encoding, such as a 2D bar-code, so that rotational state of the image data can be ignored). In still other embodiments, the orientation-determining step can be omitted because the decoding can readily proceed without this information. For example decoding which relies on the Fourier-Mellin transform produces data in which scale and rotation can be ignored.)

Once the orientation of the object is discerned, the image data may be virtually re-registered, effectively mapping it to another perspective (e.g., onto a rectilinear image plane). This mapping can employ known image processing techniques to compensate, e.g., for rotation state, scale state, differential scale state, and X-Y offset, of the original Bedoop image data. The resulting frame of data may then be more readily processed to extract the steganographically-encoded Bedoop data.

In the preferred embodiment, after the image data is remapped into rectilinear planar form, subliminal graticule data is sensed that identifies the locations within the image data where the binary data is encoded. Desirably, the binary data is redundantly encoded, e.g., in 8x8 patch blocks. Each patch comprises one or more pixels. (The patches are typically square, and thus contain 1, 4, 9, or 16, etc. pixels.) The nominal luminance of each patch before encoding (e.g., artwork pre-existing on the object) is slightly increased or decreased to encode a binary "1" or "0." The change is slight enough to be generally imperceptible to human observers, yet statistically detectable from the image data—especially if several such blocks are available for analysis. Preferably, the degree of change is adapted to the character of the underlying image, with relatively greater changes being made in regions where the human eye is less likely to notice them. Each block thus encoded can convey 64 bits of data. The encoding of such blocks in tiled fashion across the object permits the data to be conveyed in robust fashion.

Much of the time, of course, the Bedoop sensor is staring out and grabbing image frames that have no Bedoop data. Desirably, the detection process includes one or more checks to assure that Bedoop data is not wrongly discerned from non-Bedoop image data. Various techniques can be employed to validate the decoded data, e.g., error detecting codes can be included in the Bedoop payload and checked to confirm correspondence with the other Bedoop payload. Likewise, the system can confirm that the same Bedoop data is present in different tiled excerpts within the image data, etc.

(Details of the preferred encoding techniques are further detailed in co-pending applications Ser. No. 09/293,601, filed Apr. 15, 1999, entitled METHODS AND DEVICES FOR RECOGNIZING BANKNOTES AND RESPONDING ACCORDINGLY, Ser. No. 09/127,502, filed Jul. 31, 1998, and U.S. Pat. No. 5,862,260.)

Data Structures, Formats, Protocols, and Infrastructures

In an exemplary system, the Bleepoo data payload is 64 bits. This payload is divided into three fields CLASS (12 bits), DNS (24 bits) and UID (24 bits). (Other payload lengths, fields, and divisions, are of course possible, as is the provision of error-checking or error-correcting bits.)

Within the above-described eight patch-by-eight patch data block, the bits are ordered row by row, starting with the upper left patch. The first 12 bits are the CLASS ID, followed by 24 bits of DNS data followed by 24 bits of UID data. (In other embodiments, the placement of bits comprising these three fields can be scrambled throughout the block.)

Briefly, the CLASS ID is the most rudimentary division of Bleepoo data, and may be analogized, in the familiar internet taxonomy, to the limited number of top level domains (e.g., .com, .net, .org, .mil, .edu, .jp, .de, .uk, etc.). It is basically an indicator of object type. The DNS ID is an intermediate level of data, and may be analogized to internet server addresses (e.g., biz.yahoo, interactive.wsj, etc.). The UID is the finest level of granularity, and, can roughly be analogized to internet pages on a particular server (e.g., edition/current/summaries/front.htm, daily/home/default.htm, etc.).

Generally speaking, the CLASS ID and DNS ID, collectively, indicate to the system what sort of Bleepoo data is on the object. In the case of Bleepoo systems that rely on remote servers, the CLASS and DNS IDs are used in identifying the server computer that will respond to the Bleepoo data. The UID determines precisely what response should be provided.

In the case of a refrigerator Bleepoo system, what happens if an object with an unfamiliar CLASS/DNS ID data is encountered? The system can be programmed not to respond at all, or to respond with a raspberry-like sound (or other feedback) indicating "I see a Bleepoo object but don't know what to do with it."

Most systems will be able to respond to several classes of Bleepoo objects. Simple software-based systems can compare the CLASS/DNS ID (and optionally the UID) to fixed values, and can branch program execution to corresponding subroutines. Likewise, hardware-based systems can activate different circuitry depending on the detected CLASS/DNS ID.

In the case of a computer equipped with a Bleepoo input device (e.g., a Sony VAIO PictureBook laptop with built-in camera), the operating system's registry database can be employed to associate different application programs with different CLASS/DNS IDs (just as the .XLS and .DOC file extensions are commonly associated by existing operating system registries to invoke Microsoft Excel and Word software applications, respectively). When a new Bleepoo application is installed, it logs an entry in the registry database indicating the CLASS/DNS ID(s) that it will handle. Thereafter, when an object with such a CLASS/DNS ID is encountered, the operating system automatically launches the corresponding application to service the Bleepoo data in an appropriate manner.

Sometimes the computer system may encounter a Bleepoo object for which it does not have a registered application program. In such case, a default Bleepoo application can be invoked. This default application can, e.g., establish an

internet link to a remote server computer (or a network of such computers), and can transmit the Bleepoo data (or a part of the Bleepoo data) to that remote computer. The remote server can undertake the response itself, it can instruct the originating computer how to respond appropriately, or it can undertake some combination of these two responses. (Such arrangements are further considered below.)

FIG. 2 shows an illustrative architecture employing the foregoing arrangement.

At a local Bleepoo system 28 (which may be implemented, for example, using a conventional personal computer 29), a camera, scanner, or other optical sensor 30 provides image data to a decoder 32 (which may be implemented as a software component of the operating system 33). The decoder 32 analyzes the image data to discern the plural-bit Bleepoo data. The CLASS ID of this Bleepoo data is applied to a Bleepoo registry 34. The registry responds by identifying and launching a local Bleepoo application 36 designed to service the discerned Bleepoo data.

Sometimes the system 28 may encounter a Bleepoo object for which several different responses may be appropriate. In the case of a printed office document, for example, one response may be as described above—to present the electronic version of the file on a computer, ready for editing. But other responses may also be desired, such as writing an email message to the author of the printed document, with the author's email address already specified in the message address field, etc.

Such different responses may be handled by different Bleepoo applications, or may be options that are both provided by a single Bleepoo application. In the former case, when the CLASS/DNS IDs are decoded and provided to the operating system, the registry indicates that there are two (or more) programs that might be invoked. The operating system can then present a dialog box to the user inviting the user to specify which form of response is desired. Optionally, a default choice can be made if the user doesn't specify within a brief period (e.g., three seconds). The operating system can then launch the Bleepoo application corresponding to the chosen response.

A similar arrangement can be employed if a single Bleepoo application can provide both responses. In such case the operating system launches the single Bleepoo application (since there is no ambiguity to be resolved), and the application presents the choice to the user. Again, the user can select, or a default choice can be automatically made.

In the just-described situations, the user can effect the choice by using the keyboard or mouse—as with traditional dialog boxes. But Bleepoo provides another, usually easier, form of interaction. The user can make the selection through the optical sensor input. For example, moving the object to the right can cause a UI button on the right side of the dialog box to be selected; moving the object to the left can cause a UI button on the left side of the dialog box to be selected; moving the object towards the camera can cause the selected button to be activated. Many other such techniques are possible, as discussed below.

If the registry 34 does not recognize, or otherwise does not know how to respond to Bleepoo data of that particular CLASS/DNS, the registry launches a default Bleepoo client application. This client application, in turn, directs a web browser 40 on the local Bleepoo system 28 to communicate with a remote master registration server computer 42. The local computer forwards the Bleepoo data to this master server. The master server 42 examines the CLASS ID, and forwards the Bleepoo data (directly, or through intervening servers) to a corresponding CLASS server 44. (A single

server may handle Bedoop data of several classes, but more typically there is a dedicated server for each CLASS.)

Each CLASS server 44 serves as the root of a tree 46 of distributed DNS servers. A DNS server 48a, for example, in a first tier 50 of the DNS server tree, may handle Bedoop data having DNS IDs beginning with "000." Likewise, DNS server 48b may handle Bedoop data having DNS IDs beginning with "001," etc., etc.

Each DNS server in the first tier 50 may, in turn, route Bedoop data to one of 8 servers in a second tier of the tree, in accordance with the fourth-through sixth bits of the DNS data. The tree continues in this fashion until a terminal level of DNS leaf node servers 56.

Ultimately, Bedoop data routed into this network reaches a DNS leaf node server 56. That leaf node server may handle the Bedoop data, or may redirect the local Bedoop system to a further server 58 that does so. That ultimate server—whether a DNS leaf node server or a further server—can query the local Bedoop system for further information, if necessary, and can either instruct the local Bedoop system how to respond, or can undertake some or all of the response itself and simply relay appropriate data back to the local Bedoop system.

In arrangements in which the local Bedoop system is redirected, by the DNS leaf node server, to a further server that actually handles the response, access to the further server may be through a port 59 (e.g., a special URL) tailored to receipt of Bedoop data.

In a typical implementation, most or all of the servers are mirrored, or otherwise replicated/redundant, so that failure of individual computers does not impair operation of the system.

Caching can be provided throughout the trees of servers to speed responses. That is, responses by leaf nodes for certainly commonly-encountered CLASS/DNS IDs can be temporarily stored earlier in the tree(s). Bedoop data, propagating through the server network, can prompt a response from an intermediate server if there is a cache hit.

If desired, Bedoop traffic through the above-detailed server trees can be monitored to collect demographic and statistical information as to what systems are sending what Bedoop data, etc. One use of such information is to dynamically reconfigure the DNS network to better balance server loads, to virtually relocate DNS resources nearer regions of heavy usage, etc. Another use of such information is for marketing purposes, e.g., to promote certain Bedoop features and applications within user groups (e.g., internet domains) that seem to under-utilize those features.

Within certain user networks that are linked to the internet, e.g., corporate networks, Bedoop data that isn't handled within the originating Bedoop system may first be routed to a Bedoop name server within the corporate network. That server will recognize certain types of Bedoop data, and know of resources within the corporate network suitable for handling same. Referral to such resources within the corporate network will be made, where possible. These resources (e.g., corporate servers) may respond to Bedoop data in a way customized to the corporate preferences. If the corporate Bedoop name server does not know of a resource within the corporate network that can respond to the Bedoop data, the corporate name server then routes the data to the public Bedoop network described above. (Such referral can be to the master registration server or, to the extent the corporate name server knows the addresses of appropriate servers within the DNS server tree, or of the further servers to which DNS servers may point for certain Bedoop data, it can redirect the local Bedoop system accordingly.)

In typical rich Bedoop implementations, local systems may have libraries of Bedoop services, applications, or protocols. Some may be unique to that computer. Others may be commonly available on all computers. Some may be highly secure, employing encryption and/or anti-hacking measures, or data protocols that are not generally recognized. Others may be shareware, or the result of open-source programming efforts.

Greeting Cards, Birthday Cards, Etc.

In accordance with a further embodiment of the invention, greeting cards and the like are encoded (e.g., by texturing, printing, etc.) with Bedoop data. On receiving such a card, a recipient holds it in front of the image capture device on a laptop or other computer. The computer responds by displaying an internet web page that has a stock- or customized-presentation (image, video, audio-video, etc.) to complement that presented on the greeting card.

The web site presentation can be personalized by the sender (e.g., with a text message, recent family photographs, etc.), either at the point of card sale, or sometime after the card is purchased. In the latter case, for example, the card can be serialized. After taking the card home, the purchaser can visit the card vendor's web site and enter the card serial number in an appropriate user interface. The purchaser is then presented with a variety of simple editing tools to facilitate customization of the web greeting. When the sender is finished designing the web greeting, the finished web page data is stored (by software at the vendor's web site) at a site corresponding to the serial number.

When the card is received by a recipient and held in front of a Bedoop sensor, CLASS, DNS, and UID data is decoded from the card. The CLASS and DNS data are used to navigate the earlier-described server network to reach a corresponding DNS leaf node server (perhaps maintained by the Hallmark greeting card company). That leaf node server indexes a table, database, or other data structure with the UID from the Bedoop data, and obtains from that data structure the address of an ultimate web site—the same address at which the web greeting customized by the sender was stored. That address is provided by the DNS leaf node server back to the local computer, with instructions that the web page at that address be loaded and displayed (e.g., by HTML redirection). The local computer complies, presenting the customized web greeting to the card recipient.

In the just-described embodiment, in which a pre-encoded card is purchased by a sender and the web-display is then customized, the address of the web site is typically determined by the card vendor. But this need not be the case. Likewise, the card need not be "purchased" in the typical, card-shop fashion.

To illustrate the foregoing alternatives, consider the on-line acquisition of a greeting card, e.g., by visiting a web site specializing in greeting cards. With suitable selection (and, optionally, customization), the desired card can be printed using an inkjet or other printer at the sender's home. In such case, the Bedoop data on the card can be similarly customized. Instead of leading to a site determined by the card vendor, the data can lead to the sender's personal web page, or to another arbitrary web address.

To effect such an arrangement, the sender must arrange for a DNS leaf node server to respond to a particular set of Bedoop data by pointing to the desired web page. While individuals typically will not own DNS servers, internet service providers commonly will. Just as AOL provides simple tools permitting its subscribers to manage their own modest web pages, internet service providers can likewise provide simple tools permitting subscribers to make use of

11

DNS leaf node servers. Each subscriber may be assigned up to 20 UIDs (under a particular CLASS and DNS). The tools would permit the users to define a corresponding web address for each UID. Whenever a Bedoop application led to that DNS leaf node server, and presented one of those UIDs, the server would instruct the originating computer to load and present the web page at the corresponding web address 58.

Prior to customizing the greeting card, the sender uses the tool provided by the internet service provider to store the address of a desired destination web address in correspondence with one of the sender's available UIDs. When customizing the greeting card, the sender specifies the Bedoop data that is to be encoded, including the just-referenced UID. The greeting card application encodes this data into the artwork and prints the resulting card. When this card is later presented to a Bedoop system by the recipient, the recipient's system loads and displays the web page specified by the sender.

Commerce in Bedoop Resources

In the just-described arrangement, internet service providers make available to each subscriber a limited number of UIDs on a DNS server maintained by the service. Business enterprises typically need greater Bedoop resources, such as their own DNS IDs (or even their own CLASS IDs).

While variants of the Bedoop system are extensible to provide an essentially unlimited number of CLASS IDs and DNS IDs, in the illustrated system these resources are limited. Public service, non-profit, and academic applications should have relatively generous access to Bedoop resources, either without charge or for only a modest charge. Business enterprises, in contrast, would be expected to pay fees to moderate their potentially insatiable demand for the resources. Small businesses could lease blocks of UIDs under a given CLASS/DNS ID. Larger businesses could acquire rights to entire DNS IDs, or to entire CLASS IDs (at commensurately greater fees).

Web-based systems for assigning DNS IDs (and CLASS IDs) can be modeled after those successfully used by Internic.com, and now Networksolutions.com, for registration of internet domains. The user fills out a web-based form with names, addresses, and billing information; the system makes the necessary changes to all of the hidden system infrastructure—updating databases, routing tables, etc., in servers around the world.

Controlled-Access ID

Just as the above-described embodiment employed an ink-jet printer to produce a customized-Bedoop greeting card, the same principles can likewise be applied to access-control objects, such as photo-IDs.

Consider an employment candidate who will be interviewing at a new employer. The candidate's visit is expected, but she is not recognized by the building's security personnel. In this, and many other applications, arrangements like the following can be used.

The employer e-mails or otherwise sends the candidate an access code. (The code can be encrypted for transmission.) The code is valid only for a certain time period on a given date (e.g., 9:00 a.m.—11:00 a.m. on Jun. 29, 1999).

Upon receipt of the access code, the candidate downloads from the web site of the state Department of Motor Vehicles the latest copy of her driver's license photo. The DMV has already encoded this photo with Bedoop data. This data leads to a state-run DNS leaf node server 56. When that server is presented with a UID decoded from a photograph, the server accesses a database and returns to the inquiring computer a text string indicating the name of the person depicted by the photograph.

12

The candidate incorporates this photo into an access badge. Using a software application (which may be provided especially for such purposes, e.g., as part of an office productivity suite), the photo is dragged into an access badge template. The access code emailed from the employer is also provided to this application. On selecting "Print," an ink-jet printer associated with the candidate's computer prints out an access badge that includes her DMV photo and her name, and is also steganographically encoded in accordance with the employer-provided access code.

The name printed on the badge is obtained (by the candidate's computer) from the DMV's DNS server, in response to Bedoop data extracted from the photograph. (In this application, unlike most, the photograph is not scanned as part of a Bedoop process. Instead, the photograph is already available in digital form, so the Bedoop decoding proceeds directly from the digital representation.)

For security purposes, the access code is not embedded using standard Bedoop techniques. Instead, a non-standard format (typically steganographic) is employed. The embedding of this access code can span the entire face of the card, or can be limited to certain regions (e.g., excluding the region occupied by the photograph).

On the appointed day the candidate presents herself at the employer's building. At the exterior door lock, the candidate presents the badge to an optical sensor device, which reads the embedded building access code, checks it for authenticity and, if the candidate arrived within the permitted hours, unlocks the door.

Inside the building the candidate may encounter a security guard. Seeing an unfamiliar person, the guard may visually compare the photo on the badge with the candidate's face. Additionally, the guard can present the badge to a portable Bedoop device, or to one of many Bedoop systems scattered throughout the building (e.g., at every telephone). The Bedoop system extracts the Bedoop data from the card (i.e., from the DMV photograph), interrogates the DMV's DNS server with this Bedoop data, and receives in reply the name of the person depicted in the photograph. (If the Bedoop system is a telephone, the name may be displayed on a small LCD display commonly provided on telephones.)

The guard checks the name returned by the Bedoop system with the name printed on the badge. On seeing that the printed and Bedoop-decoded names match (and optionally checking the door log to see that a person of that name was authorized to enter and did so), the security guard can let the candidate pass.

It will be recognized that the just-described arrangement offers very high security, yet this security is achieved without the candidate ever previously visiting the employer, without the employer knowing what the candidate looks like, and by use of an access badge produced by the candidate herself.

Variants of such home-printed badge embodiments find numerous applications. Consider purchasing movie- or event-tickets over the web. The user can print an access ticket that has an entry code embedded therein. On arriving at the theater or event, the user presents the ticket to an optical scanning device, which decodes the entry code, checks the validity of same, authorizes the entry, and marks that entry code as having been used (preventing multiple uses of tickets printed with the same code).

Ink-Jet Printing

In the foregoing discussions, reference has been made to use of ink-jet printing as a means for providing steganographically encoded indicia on substrates. The following discussion expands on some of the operative principles.

13

The basic physics and very low level analog electronic operation of ink-jet printers (sometimes termed bubble-jet printers) are ideally suited to support very-light-tint background digital watermarking on any form of substrate. (Watermarking through apparent "tinting" of substrates is discussed in copending application Ser. No. 09/127,502.) In general, the statement, "if you can print it with an ink jet printer, you can watermark it" is largely accurate, even for (perhaps especially for) simple text documents. Indeed, there is a degree of flexibility and control in the ink-jet printing realm that is not as generally available in more traditional printing technologies, such as commercial offset printing and other plate-based technologies. (This is not to say that ink-jet has better quality than plate-based technologies; it has more to do with the statistics of ink droplets than anything else.) Heavier tint backgrounds are possible as well, where the continuum ranges from very light background tinting, where the casual observer will see "white paper," all the way through heavily inked patterned backgrounds, and photographs themselves, and everything in between.

In some embodiments, the ink-jet driver software is modified to provide lower-level control of individual droplet emission than is provided in existing printer drivers, which are naturally optimized for text and graphics. In some such embodiments, the "watermarking" print mode is another option from which the user can select (e.g., in addition to High Quality, Econo-Fast, etc.), or the selection can be made automatically by application software that is printing watermarked data.

In more sophisticated embodiments, the watermark data is applied to the printer driver software independently of the other image/text data. The printer driver is arranged to eject droplets in the usual print density for the image/text data, and at a more accurately-controlled, finer density for the separately-applied watermark data. (The latter may be effected as a slight modulation signal on the former.) This arrangement provides for essentially transparent integration into existing printer environments—no one need worry about the watermarking capability except the software applications that specifically make use of same.

Consumer Marking of Web-Based Materials

Various items of printed media can originate off the web, yet be printed at home. Examples include movie tickets, coupons, car brochures, etc. Bedoop data can be added, or modified, by the software application or by the printer driver at the time of printing. (Alternatively, the Bedoop data can be customized to correspond to the user before being downloaded to the user's system for printing.)

One advantage to Bedoop-encoding printed images locally, as opposed to Bedoop-encoding the image files prior to downloading for local printing, is that the encoding can be tailored in accordance with the particular properties of the local printer (e.g., to increase robustness or decrease visibility)—properties not generally known to a remote server.

In one particular example, the UID field in the Bedoop data can be written with a value that serves as an index to a database of user profiles, permitting later systems to which the printed item is presented to personalize their response in accordance with the profile data.

In another example, the UID field serves an authentication purpose, e.g., to verify that the printed medium actually was printed at a particular place, or by a particular user or at a particular time.

Coffee Mug
At retail coffee outlets, customers commonly order the same drink day after day ("half-decaf, short, skinny latte").

14

Some customers present personal coffee mugs to the cashier, preferring the sensation of ceramic or metal to paper, and avoiding the trash/recycle dilemma.

The drinker's "regular" order can be Bedoop-encoded either on the mug itself or, more commonly, on an adhesive label applied to the mug. The encoding can be in addition to other aesthetic imagery (e.g., artwork or a photo), or the marking can be purely data. Labels the size of postage stamps may be used.

On handing the mug to the cashier, the customer can simply say "the regular." The cashier passes the mug in front of the optical scanning device of a Bedoop system associated with the cash register. The system steganographically decodes the data and provides the corresponding order ("half-decaf, short, skinny latte"), either textually or audibly (e.g., by a voice synthesizer) to the cashier or the barrista. The cash register system also knows the current price of the requested drink, and rings up the charge accordingly.

Labels of the type described can be available to the cashier on pre-printed rolls, just as with other adhesive stickers, or can be printed on-demand. (Small label printers may be best suited in the latter case, given space constraints in retail outlets.) Customers ordering drinks for personal mugs may be invited to take a label corresponding to their just-ordered drink and apply it to their mug for future use.

In variants on this basic theme, the mug label can be further encoded (or a supplemental label can be provided and encoded) with electronic payment information, such as the customer's credit card number, or the number of a debit account maintained by the coffee merchant for that customer. When the mug is scanned for the drink order, the system likewise detects the payment information and charges the corresponding fee to the appropriate account. (For security reasons, the system may be arranged so that the mug cannot be used to authorize more than, say \$5 of coffee drink purchases per day.)

In another variant on this theme, the system maintains an electronic log of coffee purchases made by the customer and, in accordance with then-prevailing marketing considerations, rewards the customer with a free drink after 8 or 12, etc., drinks have been purchased.

In still another variant on this theme, regular customers who use Bedoop-labeled mugs can participate in periodic promotions in which, for example, every N^{th} such customer is rewarded with a cash or merchandise prize. Bells go off when the N^{th} mug is scanned. (N can be a fixed number, such as 500, or can be a random number—typically within a known range or with a known mean.)

Smart Elevators

In accordance with another embodiment of the invention, a building elevator is provided with one or more optical capture devices. Each device examines monitors the contents of the elevator chamber looking for Bedoop encoded objects, such as ID badges.

On sensing a Bedoop-encoded object, the elevator can determine—among other data—the floor on which the wearer's office is located. The system can then automatically direct the elevator to that floor, without the need for the person to operate any buttons. (The elevator's button panel can be provided with a new, override button that can be operated to un-select the most recently selected floor(s), e.g., in case a user wants to travel to a different floor.) To aid in identification, the Bedoop objects (e.g., badges) can be colored a distinctive color, permitting the system to more easily identify candidate objects from other items within the optical capture devices' field of view. Or the object can be provided with a retro-reflective coating, and the elevator can

15

be equipped with one or more illumination sources of known spectral or temporal quality (e.g., constant infra red, or constant illumination with a single- or multi-line spectrum, or a pulsed light source of known periodicity, LEDs or semiconductor lasers, each with an associated diffuser, can be used for each the foregoing and can be paired with the image capture devices). Other such tell-tale clues can likewise be used to aid in object location. In all such cases, the optical capture device can sense the tell-tale clue(s) using a wide field of view sensor. The device can then be physically or electronically steered, and/or zoomed, to acquire a higher resolution image of the digitally-encoded object suitable for decoding.

Magazines

Magazine (and newspaper) pages can be steganographically encoded with Bedoop data to provide another "paper as portal" experience. As with the earlier described office document case, the encoded data yields an address to a computer location (e.g., a web page) having the same, or related, content.

In one exemplary embodiment, the blank magazine page stock is Bedoop-encoded prior to printing. The watermarking can be performed by high speed ink-jet devices, which splatter a fine pattern of essentially imperceptible ink droplets across each page. Each page can be differently watermarked so that, on decoding, page 21 of a magazine can be distinguished from page 22 of the same magazine (and page 106 of the Jun. 21, 1999, issue can be distinguished from page 106 of the Jun. 28, 1999, issue). If desired, each page can be further segregated into regions—either in accordance with the actual boundaries of articles that will later be printed on the pages, or in a grid pattern, e.g., of 3 columns across by 5 rows high. Each region conveys a distinct Bedoop code, permitting different portions of the page to lead to different web data.)

After watermarking and printing, the pages thus produced are bound in the usual fashion with others to form the finished magazine. (Not all pages in the magazine need to be watermarked.)

Of course, the watermarking can be effected by processes other than ink-jet printing. For example, texturing by pressure rollers is another option well suited for the large volumes of paper to be processed.

On presenting a magazine to the optical scanner device of a Bedoop-compliant computer, the computer senses the Bedoop data, decodes same, and launches a web browser to an internet address corresponding to the Bedoop data. If the magazine page is an advertisement, the internet address can provide information complementary to the advertisement. For example, if the magazine page is an advertisement for a grocery item, the Bedoop data can identify a web page on which recipes using the advertised item are presented. If the magazine page includes a photo of a tropical beach, the Bedoop data can lead to a travel web page (e.g., hosted by Expedia or other travel service) that presents fare and lodging information useful to a reader who wants to vacation at the illustrated beach. (The fare information can be customized to the reader's home airport by reference to user profile data stored on the user's computer and relayed to the web site to permit customization of the displayed page.)

The data to which the Bedoop data leads needn't be static; it can be updated on a weekly, daily, or other basis. Thus, if a months-old magazine page is presented to a Bedoop device, the resultant data can be up-to-the-minute.

In the case of advertising, the inclusion of Bedoop data increases the value of the ad to the advertiser, and so merits a higher charge to the advertiser from the magazine pub-

16

lisher. This higher charge may be shared with the enterprise (s) that provides the Bedoop technology and infrastructure through which the higher value is achieved.

Business Card Applications

Conventional business cards can be steganographically encoded with Bedoop data, e.g., by texturing, watermark tinting, ink-jet splattering, text steganography, etc. As with many of the earlier-described embodiments, the steganographic encoding is tailored to facilitate decoding in the presence of arbitrary rotation or scale distortion of the card introduced during scanning. (Some such techniques are shown, e.g., in applicant's related patents identified above. Various other techniques are known to artisans.)

When a recipient of a business card holds it in front of a Bedoop sensor, the operating system on the local system launches a local Bedoop application. That local Bedoop application, in turn, establishes an external internet connection to a remote business card server. The address of that server may already be known to the local Bedoop application (e.g., having been stored from previous use), or the local Bedoop system can traverse the above-described public network of DNS servers to reach the business card server.

A database on the business card name server maintains a large collection of business card data, one database record per UID. When that server receives Bedoop data from a local Bedoop system, it parses out the UID and accesses the corresponding database record. This record typically includes more information than is commonly printed on conventional business cards. Sample fields from the record may include, for example, name, title, office phone, office fax, home phone, home fax, cellular phone, email address, company name, corporate web page address, personal web page address, secretary's name, spouse's name, and birthday. This record is transmitted back to the originating Bedoop system.

The local Bedoop system now has the data, but needs further instruction from the user as to how it should be processed. Should a telephone number be dialed? Should the information be entered into a personal contact manager database (e.g., Outlook) on the local system? Etc.

In an exemplary embodiment, the local system presents the available choices to the user, e.g., by textual prompts, synthesized voice, etc. The user responds by manipulating the business card in a manner prompted by the system (e.g., move down to telephone at office; move up to telephone at home; move right to access corporate web page; move left to access personal web page; rotate left to enter certain elements from the database record (filtered in accordance with a template) into personal contact manager database, etc. The local Bedoop system responds accordingly.

Some card givers may choose to make additional information available to card recipients—information beyond that known in prior art contact-management software applications. For example, one of the choices presented by a local Bedoop system in response to presentation of a business card may be to review the card-giver's personal calendar. (The card-giver can maintain his or her personal calendar on a web-accessible computer.) By such arrangement, the card-recipient can learn when the card-giver may be found in the office, when appointments might be scheduled, etc., etc.

Typically, access to this web-calendar is not available to casual web browsers, but is accessible only in response to Bedoop data (which may thus be regarded as a form of authentication or password data).

Some users may carry several differently-encoded cards, each with a different level of access authorization (e.g., with different UIDs). Thus, some cards may access a biographical

17

page without any calendar information, other cards may access the same or different page with access enabled to today's calendar, or this week's calendar, only, and still other cards (e.g., the "spouse" card) may access the same or different page with access enabled for the card-giver's complete calendar. The user can distribute these different cards to different persons in accordance with the amount of personal information desired to be shared with each.

In accordance with a related embodiment, the database record corresponding to Bedoop business card data can include a "now" telephone number field. This field can be continually-updated throughout the day with the then-most-suitable communications channel to the card-giver. When the card-giver leaves home to go to the office, or leaves the office for a trip in the car, or works a week at a corporate office in another town, etc., this data field can be updated accordingly. (A pocket GPS receiver, with a wireless uplink, can be carried by the person to aid in switching the "now" number among various known possibilities depending on the person's instantaneous position.) When this database record is polled for the "now" number, it provides the then-current information.

Consider a Bedoop-enabled public telephone. To dial the phone, a business card is held in front of the Bedoop sensor (or slid through an optical scanner track). The phone interrogates the database at the business card server for the "now" number and dials that number.

To update the any of the fields stored in the database record, the card giver can use a special card that provides write-authorization privileges. This special card can be a specially encoded version of the business card, or can be another object unique to the card-giver (e.g., the card-giver's driver's license).

The reference to business cards and personal calendars is illustrative only. Going back a century, "calling cards" were used by persons whose interests were strictly social, rather than business. The just-discussed principles can be similarly applied. Teenagers can carry small cards to exchange with new acquaintances to grant access to private dossiers of personal information, favorite music, artwork, video clips, etc. The cards can be decorated with art or other indicia that can serve purposes wholly unrelated to the Bedoop data steganographically encoded therein.

Gestural Input

A Bedoop system can determine the scale state, rotation state, X-Y offset, and differential scale state, of an object by reference to embedded calibration data, or other techniques. If the scan device operates at a suitably high frame rate (e.g., five or ten frames per second), change(s) in any or all of these four variables can be tracked over time, and can serve as additional input.

In an earlier-discussed example, moving an object to the left or right in front of the Bedoop scanner caused a left- or right-positioned button in a dialog box to be selected. This is a change in the X-Y offset of the scanned object. In that earlier example, moving the object inwardly towards the camera caused the selected button to be activated. This is a change in the scale state of the scanned object.

In similar fashion, twisting the object to the left or right can prompt one of two further responses in a suitably programmed Bedoop application. (This is a change in the rotation state.) Likewise, tilting the object so that one part is moved towards or away from the camera can prompt one of two further responses in the application. (This is a change in the differential scale state.)

In the business card case just-discussed, for example, the card can be held in front of the Bedoop scanner of a

18

computer. If the card is twisted to the left, the computer opens a web browser to a web page address corresponding to Bedoop data on the card. If the card is twisted to the right, the computer opens an e-mail template, pre-addressed to an e-mail address indicated by the card.

In other examples, twisting an object to move the right edge towards the scanner can be used to effect a right mouse click input, and twisting the object to move the right edge away from the scanner can be used to effect a left mouse click input.

Simultaneous changes in two of these four positioning variables can be used to provide one of four different inputs to the computer (e.g., (a) twisting left while moving in; (b) twisting left while moving out; (c) twisting right while moving in; and (d) twisting right while moving out). Simultaneous changes to three or all four of these variables can similarly be used to provide one of eight or sixteen different inputs to the computer.

Simultaneous manipulations of the object in two or more of these modes is generally unwieldy, and loses the simple, intuitive, feel that characterizes manipulation of the object in one mode. However, a similar effect can be achieved by sequential, rather than simultaneous, manipulation of the card in different modes (e.g., twist left, then move in). Moreover, sequential manipulations permit the same mode to be used twice in succession (e.g., move in, then move out). By such sequential manipulations of the object, arbitrarily complex input can be conveyed to the Bedoop system.

(It will be recognized that a digitally-encoded object is not necessary to the gestural-input applications described above. Any object (talisman) that can be distinguished in the image data can be manipulated by a user in the manners described above, and an appropriate system can recognize the movement of the object and respond accordingly. The provision of digital data on the object provides a further dimension of functionality (e.g., permitting the same gesture to mean different things, depending on the digital encoding of the object being manipulated), but this is not essential.

Moreover, even within the realm of digitally-encoded gestural talismans, steganographic encoding is not essential. Any other known form of optically-recognizable digital encoding (e.g., 1D and 2D bar codes, etc.) can readily be employed.

In an illustrative embodiment, a business card or photograph is used as the talisman, but the range of possible talismans is essentially unlimited.

Gestural Decoding Module

There are various ways in which the Bedoop system's decoding of gestural input can be effected. In some Bedoop systems, this functionality is provided as part of the Bedoop applications. Generally, however, the applications must be provided with the raw frame data in order to discern the gestural movements. Since this functionality is typically utilized by many Bedoop applications, it is generally preferable to provide a single set of gestural interpretation software functions (commonly at the operating system level) to analyze the frame data, and make available gestural output data in standardized form to all Bedoop applications.

In one such system, a gestural decoding module tracks the encoded object within the series of image data frames, and outputs various parameters characterizing the object's position and manipulation over time. Two of these parameters indicate the X-Y position of the object within current frame of image data. The module can identify a reference point (or several) on the object, and output two corresponding position data (X and Y). The first represents the horizontal offset

19

of the reference point from the center of the image frame, represented as a percentage of frame width. A two's complement representation, or other representation capable of expressing both positive and negative values, can be used so that this parameter has a positive value if the reference point is right of center-frame, and has a negative value if the reference point is left of center-frame. The second parameter, Y, similarly characterizes the position of the reference point above or below center-frame (with above-being represented by a positive value). Each of these two parameters can be expressed as a seven-bit byte. A new pair of X, Y parameters is output from the gestural decoding module each time a new frame of image data is processed.

In many applications, the absolute X-Y position of the object is not important. Rather, it is the movement of the object in X and Y from frame-to-frame that controls some aspect of the system's response. The Bedoop application can monitor the change in the two above-described parameters, frame to frame, to discern such movement. More commonly, however, the gestural decoding module performs this function and outputs two further parameters, X' and Y'. The former indicates the movement of the reference point in right/left directions since the last image frame, as a percentage of the full-frame width. Again, this parameter is represented in two's complement form, with positive values representing movement in the rightward direction, and negative values representing movement in the leftward direction. The latter parameter similarly indicates the movement of the reference point in up/down directions since the last frame.

The scale, differential scale, and rotation states of the object can be similarly analyzed and represented by parameters output from the gestural decoding module.

Scale state can be discerned by reference to two (or more) reference points on the object (e.g., diagonal corners of a card). The distance between the two points (or the area circumscribed by three or more points) is discerned, and expressed as a percentage of the diagonal size of the image frame (or its area). A single output parameter, A, which may be a seven-bit binary representation, is output.

As with X-Y data, the gestural decoding module can likewise monitor changes in the scale state parameter since the last frame, and produce a corresponding output parameter A'. This parameter can be expressed in two's complement form, with positive values indicating movement of the object towards the sensor since the last frame, and negative values indicating movement away.

A differential scale parameter, B, can be discerned by reference to four reference points on the object (e.g., center points on the four edges of a card). The two points on the side edges of the card define a horizontal line; the two points on the top and bottom edges of the card define a vertical line. The ratio of the two line lengths is a measure of differential scale. This ratio can be expressed as the shorter line's length as a percentage of the longer line's length (i.e., the ratio is always between zero and one). Again, a two's complement seven-bit representation can be used, with positive values indicating that the vertical line is shorter, and negative values indicating that the horizontal line is shorter. (As before, a dynamic parameter B' can also be discerned to express the change in the differential scale parameter B since the last frame, again in two's complement, seven bit form.)

A rotation state parameter C can be discerned by the angular orientation of a line defined by two reference points on the object (e.g., center points on the two side edges of a card). This parameter can be encoded as a seven-bit binary value representing the percentage of rotational offset in a clockwise direction from a reference orientation (e.g.,

20

horizontal). (The two reference points must be distinguishable from each other regardless of angular position of the object, if data in the full range of 0-360 degrees is to be represented. If these two points are not distinguishable, it may only be possible to represent data in the range of 0-180 degrees.) As before, a dynamic parameter C' can also be discerned to express the change in the rotation state parameter C since the last frame. This parameter can be in seven bit, two's complement form, with positive values indicating change in a clockwise rotation.

The foregoing analysis techniques, and representation metrics, are of course illustrative only. The artisan will recognize many other arrangements that can meet the needs of the particular Bedoop applications being served.

In the illustrative system, the Bedoop application programs communicate with the gestural decoding module through a standardized set of interface protocols, such as APIs. One API can query the gestural input module for some or all of the current position parameters (e.g., any or all of X, Y, A, B, and C). The module responds to the calling application with the requested parameter(s). Another API can query the gestural input module for some or all of the current movement data (e.g., any or all of X', Y', A', B' and C'). Still another API can request the gestural decoding module to provide updated values for some or all of the position or movement data on a running basis, as soon as they are discerned from each frame. A complementary API discontinues the foregoing operation. By such arrangement, all of the gestural data is available, but the Bedoop application programs only obtain the particular data they need, and only when they ask for it.

In Bedoop applications that communicate with external servers, just the Bedoop data (i.e., CLASS, DNS, and optionally UID) may initially be sent. If the remote server needs to consider gestural data in deciding how to respond, the remote server can poll the local Bedoop system for the necessary data. The requested gestural data is then sent by the local Bedoop system to the remote server in one or more separate transmissions.

In other embodiments, since the gestural data is of such low bandwidth (e.g., roughly 56 bits per image frame), it may routinely and automatically be sent to the remote computer, so that the gesture data is immediately available in case it is needed. In an illustrative implementation, this data is assembled into an 8-byte packet, with the first byte of the packet (e.g., the X parameter) being prefixed with a "1" sync bit, and subsequent bytes of the packet being prefixed with "0" sync bits. (The sync bits can be used to aid in accurate packet decoding.)

In some embodiments, it is useful to provide for an extension to the normal 64-bit Bedoop length to accommodate an associated packet of gestural data. This can be effected by use of a reserved bit, e.g., in the UID field of the Bedoop packet. This bit normally has a "0" value. If it has a "1" value, that indicates that the Bedoop data isn't just the usual 64 bits, but instead is 128 bits, with the latter 64 bits comprising a packet of gestural data.

Similar extension protocols can be used to associate other ancillary data with Bedoop data. A different reserved bit in the UID field, for example, may signal that a further data field of 256 bits follows the Bedoop data—a data field that will be interpreted by the remote computer that ultimately services the Bedoop data in a known manner. (Such bits may convey, e.g., profile data, credit card data, etc.) The appended data field, in turn, may include one or more bits signaling the presence of still further appended data Grandmothers

21

It is a common complaint that computers are too complex for most people. Attempts to simplify computer-user interaction to facilitate use by less experienced users usually serve to frustrate more experienced users.

In accordance with another embodiment of the present invention, the sophistication of a computer user is steganographically indicated on a talisman used by that user to interact with the system. The computer detects this steganographically-encoded data, and alters its mode of interacting with the user accordingly.

Consider internet browser software. Experienced users are familiar with the different functionality that can be accessed, e.g., by various drop-down menus/sub-menus, by the keyboard shortcuts, by the menus available via right-clicking on the mouse, by manipulating the roller mouse scroll wheel and scroll button, etc., etc. Grandmothers of such users, typically, are not so familiar.

Although gestural interfaces hold great promise for simplifying user-computer interaction, the same dichotomy between experienced users and inexperienced users is likely to persist, frustrating one class of user or the other.

To help close this gap, a computer system according to this embodiment of the invention responds to gestures in different manners, depending on the expertise level indicated by encoding of the talisman. For an expert user, for example, the gestural interface active in the internet browser software may display the stored list of Favorite web addresses in response to tipping the left edge of the talisman towards the optical sensor. Once this list is displayed, the expert user may rotate the talisman to the right to cause the highlighting to scroll down the list from the top. Rotating the talisman to the left may scroll the list of Favorites up from the bottom. The speed of scrolling can be varied in accordance with the degree of rotation of the talisman from a default orientation.

In contrast, for the novice user, these talisman manipulations may be confounding rather than empowering. Tipping the left edge of the talisman towards the sensor may occur as often by mistake as on purpose. For such users, a more satisfactory interface may be provided by relying on simple X-Y movement of the talisman to move an on-screen cursor, with a movement of the talisman towards the sensor to serve as a selection signal (i.e., like a left-mouse click).

(In the example just-cited, the expert user summoned a list of Favorite web sites. Different "Favorites" lists can be maintained by the computer—each in association with different talismans. A husband who uses one talisman is provided a different "Favorites" list than a wife who uses a different talisman.)

Printed Pictures

In accordance with this aspect of the invention, a printed photograph can be steganographically encoded with Bedoop data leading to information relating to the depicted person (e.g., contact information, biographical information, etc.).

Such a photograph can be presented to a Bedoop sensor on a telephone. In a simple embodiment, the telephone simply processes the Bedoop data to obtain a corresponding default telephone number, and dials the number. In other embodiments, various options are possible, e.g., dial home number or dial work number. On presenting the photograph to the telephone, for example, moving the photo to the left may dial the person at home, while moving the photo to the right may dial the person at work.

As telephones evolve into more capable, multi-function devices, other manipulations can invoke other actions. In a computer/telephone hybrid device, for example, rotating the photo counterclockwise may launch a web browser to an

22

address at which video data from a web cam at the pictured person's home is presented. Rotating the photo clockwise may present an e-mail form, pre-addressed to the e-mail address of the depicted person. Moving the photo to the right may query a database on the system for other photographs depicting the same individual or subject, which can be presented in response to further user input. Etc.

In this and other embodiments, it is helpful for the Bedoop device to prompt the user to aid in manipulating the object. This can be done audibly (e.g., "move photo left to dial at home") or by visual clues (e.g., presenting left- or right-pointing arrows).

Bedoop data in photographs can also be used to annotate the photographs, as with notes on the back of a photograph, or printed under the photograph in a photo album. The Bedoop data can lead to a remote database, where the photograph owner is permitted to enter a textual (or audio) narrative in association with each photograph's UID. Years later, when some of the names have been forgotten, the photograph can be positioned in front of a Bedoop sensor, and the system responds by providing the annotation provided by the photograph owner years earlier.

Drivers Licenses and Other Cards

Drivers licenses, social security cards, or other identity documents may be encoded by the issuing authority with Bedoop data that permits access to the holder's personal records over the web. On presenting the document to a Bedoop system, the system directs a web browser to a private address corresponding to data encoded on the document. At that address, the holder of the document can review governmental records, such as state or federal tax return data, social security entitlements, etc., as well as privately-maintained records, such as credit records, etc. User selection among various functions can be effected by spatial manipulation of the document. (Entry of additional data, such as social security number or mother's maiden name, may be required of the user to assure privacy in case the document is lost or stolen.)

By manipulating a driver's license in front of a Bedoop sensor, a user can request renewal of the driver's license, and authorize payment of the corresponding fee.

Bank cards (debit, credit, etc.) can similarly be encoded with Bedoop data to permit the holder to access bank records corresponding to the bank card account. (Entry of a PIN code may be required to assure privacy.)

Such documents can also be used to access other personal data. One example is e-mail. A traveler might pause at a Bedoop kiosk at an airport and present a driver's license. Without anything more, the kiosk may present email that is waiting for the traveler on an associated display screen.

On recognizing a driver's license, the kiosk can access a remote site (which may be maintained by the Department of Motor vehicles, another government entity, a private entity, or by the traveler), authenticating the operation by presenting Bedoop data encoded on the license, and obtaining information that the person has pre-approved for release in response to such authorized access. This information can include e-mail account and password information. Using this information, the kiosk queries the corresponding e-mail server, and downloads a copy of recently received mail for presentation at the kiosk. (A user-entered PIN number may be required at some point in the process, e.g., in querying the remote site for sensitive e-mail password data, before presenting the downloaded e-mail for viewing, etc., to ensure privacy.)

Other cards carried in wallets and purses can also be encoded to enable various functions. The local sandwich

shop that rewards regular customers by awarding a free sandwich after a dozen have been purchased can encode their frequent-buyer card with Bedoop data leading to the shop's web-based sandwich delivery service. Or the frequent-buyer card can be eliminated, and customers can instead wave their business card or other identity document in front of the shop's Bedoop sensor to get purchase credit in a tally maintained by the sandwich shop's computer.

Food stamps, health insurance cards, and written medical prescriptions, can likewise be encoded with digital data to enable the provision of new functionality.

At large trade shows, such as COMDEX, vendors needn't publish thick, glossy brochures to hand out to visitors. Instead, they may print various stylish promo cards for distribution. When later presented to a Bedoop sensor, each card leads to a web-based presentation—optionally including persuasive video and other multi-media components. The user can be prompted to provide data to customize, or focus, the presentation to the user's particular requirements. If the user wants further information, a request can be made by the click of a mouse (or the twist of a card).

Prizes and Product Promotions

Product packaging (e.g., Coke cans, Snapple bottles, Pepsi 12-pack boxes) can be encoded for contest purposes. The encoding can be customized, item to item, so that selected items—when Bedoop scanned—are recognized to be the one in a hundred that entitles the owner to a cash or merchandise prize. A remote server to which the item's Bedoop data is provided queries the user for contact information (e.g., address, phone number) so the prize can be awarded or, for smaller prizes, the system can print out an award certificate redeemable at local merchants for products or cash. Once a winning item is identified to the remote server, its UID on the server is marked as redeemed so that the item cannot later be presented to win another prize.

In other such embodiments, all of the items are encoded identically. Winners are determined randomly. For example, during a contest period, persons around the world may present Coke cans to Bedoop systems. The corresponding Bedoop application on each user computer submits Bedoop data to a corresponding web address. The user's e-mail address may also be included with the submission. As this data is relayed to the corresponding server computer(s), every Nth set of data is deemed to be a winner, and a corresponding award notification or prize is dispatched to the Bedoop system from which the winning set of data originated.

The server computer that receives such contest submittals from client Bedoop systems can be arranged to prevent a single user from bombarding the server with multiple sets of data in an attempt to win by brute force. (This may be done, for example, by checking the included e-mail address, and not considering a data submittal if the same e-mail address was encountered in data submitted within the past hour. Similar anti-brute-force protection can be provided on the user's computer, preventing, e.g., repeated contest data to be sent more frequently than once per hour. More sophisticated anti-brute-force measures can of course be provided.)

Product Information and Ordering

In accordance with another embodiment of the present invention, product packaging and product advertisements can be encoded with Bedoop data that, when presented to a Bedoop system, initiates a link to a web page from which that product can be purchased, or more information obtained. Once the link has been established, the user can be instructed to manipulate the object in different of the earlier-described modes to effect different functions, e.g., move

towards camera to order the product; move away from camera for product information. If the object is moved towards the camera to effect an order, the user can be prompted to further manipulate the object to specify delivery options (e.g., rotate left for overnight mail, rotate right for regular mail). If the object is moved away from the camera to request product information, the user can be prompted to further manipulate the object to specify the type of information desired (e.g., rotate left for recipes, rotate right for FDA nutritional information, move up for information on other products in this family, move down to send an email to the product manufacturer).

Credit card or other customer billing information, together with mailing address information, can be stored in a profile on the Bedoop system, and relayed to the transactional web site either automatically when a purchase action is invoked, or after the user affirms that such information should be sent (which affirmation may be signaled by manipulation of the packaging or advertisement in one of the earlier-described modes). Other modes of payment can naturally be employed. (One such alternative is the first-to-redeem electronic money system described in the present assignee's patent application 60/134,782.)

Clothing

In accordance with another aspect of the invention, clothing can be ordered on-line by presenting to a Bedoop system a photograph from a catalog, or a garment tag or label. Encoded on each is product-identifying data, including a manufacturer ID. The Bedoop system responds by establishing a link to a remote computer maintained by or on behalf of the manufacturer. In addition to relaying the product identification data to the remote computer, the Bedoop application also sends some or all of a clothing profile maintained by the user on the local computer. This profile can specify, e.g., the person's weight, height, shoe size, waist size, inseam, etc. The remote computer can confirm availability of the identified item in the size specified in the clothing profile, and solicit payment and shipping instructions.

Computer Access Cards

This disclosure earlier considered access cards used to gain access to secure buildings. Related principles can be used in conjunction with computer access.

A driver's license, employee photo ID, or other such document can be presented to a Bedoop sensor on a computer. The computer recognizes the user and can take various steps in response.

One response is to log onto a network. Another is to set load a user profile file by which the computer knows how to arrange the desktop in the user's preferred manner. By manipulating the Bedoop-encoded object, the user can further vary the environment (e.g., rotate left to launch standard business productivity applications and software development applications; rotate left to launch luncheon diversions—stock update, recreational games, etc.).

Hotel rooms are increasingly providing computer services. By presenting a driver's license, a Bedoop-equipped computer in a hotel room can link to a remote site indicated by the Bedoop data, obtain preference data for that user, and launch applications on the hotel computer in an arrangement that mimics that user's familiar work computer environment.

Audio/Video Disks, Software, and Books

Bedoop data can be conveyed by indicia or texturing on the surfaces of CD and DVD disks, on the labels (or authenticity certificates) for same, on the enclosures for same (e.g., jewel box, plastic case, etc.), on book dust

jackets, on book pages, etc. Any of these objects can be presented to a Bedoop device to establish a link to a related web site. The consumer can then manipulate the object (or otherwise choose) to select different options.

For music, one option is to receive MP3 or other clips of songs by the same artist on other CDs, or of songs from other artists of the same genre. Another is to view music video clips featuring the same artist. Still another is to order tickets to upcoming concerts by that artist. In-store kiosks can permit tentative customers to listen to sample tracks before they buy.

Similar options can be presented for video DVDs. In the case of video, this can include listings of other movies with the same director, with the same star(s), etc. In the case of software, the options can include advisories, bug fixes, product updates and upgrades, etc. Naturally, the user can make purchases from these sites, e.g., of other music by the same artist, other videos with the same star, software upgrades, etc.

Similar options can be accessed using Bedoop data associated with printed book materials.

Ad Tracking

Advertisers commonly use different advertisements for the same product or service, and employ means to track which ad is more effective within which demographic group. Bedoop can provide such functionality.

Consider a travel service web site that is promoting Hawaiian vacations. Bedoop data from several advertisements can lead consumers to the site.

Identical advertisements can be placed in several different magazines. Each is encoded with a different Bedoop UID. By monitoring the UIDs of the Bedoop inquiries to the site, the travel service can determine which magazines yield the highest consumer response (e.g., per thousand readers).

Likewise, within a single magazine, two or more advertisements may be encoded with Bedoop data leading to the site—again, each with a different UID. Again, analysis of the UIDs used in accessing the site can indicate which advertisement was the more effective.

The instantaneous nature of the internet links permits advertisers to learn how consumer responses to print advertisements vary with time-of-day, yielding information that may assist in making ads for certain products more effective.

More elaborate variants and combinations of the foregoing are, of course, possible. If the consumers provide personal information in response to the ads (either by permitting access to pre-stored personal profile data, or by filling in web-based forms, or by manipulation of the ad (e.g., "please move the ad towards your Bedoop sensor if you drank coffee this morning")), still richer statistical data can be gleaned.

Rolodex of Cards

Bedoop-encoded business cards as detailed above can be accumulated and kept near a telephone or computer in a Rolodex-like arrangement. If a refrigerator ice-maker malfunctions, a homeowner can find the card for the appliance repairman used a few years ago, and present it to a Bedoop sensor. A link is established to the repairman's company (e.g., web site or via telephone). At a web site, the repairman may provide basic information, such as hours of availability, current fee schedule, etc. The homeowner may select an option (by card gesture or otherwise) to invoke a teleconference (e.g., NetMeeting) to consult about the problem. Or the homeowner may select another option to send e-mail. Still a further option may permit the homeowner to schedule a house call on the repairman's weekly calendar. Still a further option may permit the homeowner to view one

or more short videos instructing customers how to fix certain common appliance problems.

Stored Value Cards

The earlier cited "first-to-redeem" electronic money system may encode Bedoop data on a card that leads to storage at which the random-number tokens (which represent increments of money) are stored. Presenting the card to a Bedoop system launches an application that reads and encrypts the tokens and forwards the encrypted data to the clearinghouse computer of the corresponding bank to learn their remaining value. There the tokens are decrypted and checked for validity (but not redeemed). The bank computer responds to the Bedoop system, indicating the remaining value of the tokens on the card.

For security reasons, the storage containing the random-number tokens should not be generally accessible. Instead, the user must provide authentication data indicating authorization to gain access to that information. This authentication data may be a PIN code. Or the user may provide authentication by presenting a second Bedoop-encoded object, e.g., a driver's license to the Bedoop system. (Many other Bedoop systems may advantageously use, or require the use of, two or more Bedoop objects—either presented one after the other, or all at the same time. The Bedoop system can provide visual or audible prompts leading the user to present the further Bedoop object(s) as necessary.)

Ski Lift Tickets

In accordance with another embodiment, ski lift tickets are Bedoop encoded to provide, various functionality.

For example, instead of buying a lift ticket good for a day, a skier may purchase a ticket good for eight lifts. This data is encoded on the ticket, and sensed by a Bedoop sensor at each lift. The sensors are networked to a common server that tracks the number of lifts actually purchased, and updates the number as used. The skier is informed of the number of rides remaining on entering or leaving the lift. Statistical data can be collected about trail usage (e.g., N % percent of skiers ski all day along just two lifts, etc.).

Off the slopes, back at home, the used lift ticket may be presented to a Bedoop sensor to obtain current snow conditions and lift hours, or to review trail maps, or to order ski vacation packages. If the ticket is encoded with the owner's name, UID, or other information of commercial/marketing interest, local merchants may give the bearer discounts on selected goods in response to Bedoop scanning of the ticket and recovery of such information.

REI Membership Cards

Membership cards for certain stores can be Bedoop-encoded to provide added value to the member. For outdoor gear stores such as REI, presentation of the card to a Bedoop sensor can lead to a library of USGS maps, to web pages with current fishing and hunting regulations, etc. Naturally, the store's on-line ordering site is just a quick twist away.

Theme Park Tickets

Theme park tickets can be encoded with the age and gender of the visitor, and with additional data permitting the experience to be customized (e.g., from a roster of theme park personalities, the visitor's favorite is Indiana Jones). Throughout the park are kiosks to which the visitor can present the ticket to orchestrate the visit to follow a particular story line. Some kiosks issue premiums matching the age/gender of the recipient.

Car Keys

In accordance with another embodiment of the invention, car keys (or key ring fobs) are Bedoop encoded. When the car is taken to a shop for service, the mechanic presents the key to a Bedoop sensor, and thereby obtains the car's

maintenance history from a remote server on which it is maintained. At home, the key can be presented to a Bedoop sensor and manipulated to navigate through a variety of automotive-related web sites.

In some embodiments, the Bedoop-encoded object is not used to navigate to a site, but is instead used to provide data once a user's computer is otherwise linked to a web site. A user surfing the web who ends up at a car valuation site can present a key to the Bedoop scanner. The Bedoop data is used to access a remote database where the make, model, options, etc., of the car are stored. This data is provided to a database engine that returns to the user the estimated value of the car.

While visiting a mechanic's web site, presentation (and optionally manipulation) of a key or key ring fob can be employed to schedule a service appointment for the car. Fashion Coordination

Some department stores and clothing retailers offer "personal shoppers" to perform various services. For example, a customer who is purchasing a dress may ask a personal shopper for assistance in selecting shoes or accessories that complement the dress.

A Bedoop-encoded garment tag on the dress can be employed to obtain similar assistance. In response to such a tag, a Bedoop system can query a database to obtain a mini-catalog of clothes and accessories that have previously been identified as complementing the dress identified by the tag. These items can be individually displayed on a screen associated with the system, or a virtual model wearing the dress—together with one or more of the recommended accessories—can be synthesized and depicted. The shopper may quickly review the look achieved by the model wearing the dress with various different pairs of shoes, etc., by repeatedly activating a user interface control (by mouse, touch screen, or garment tag gestures) to cycle through different combinations.

A shopper's credit card can be Bedoop-encoded so as to lead Bedoop systems of particular stores (i.e., stores pre-authorized by the shopper) to a profile on the shopper (e.g., containing size information, repeat purchase information, return history, style/color preferences, etc.). Credit Card Purchases

When a consumer visits a commercial web site and wishes to purchase a displayed product, the transaction can be speeded simply by presenting a Bedoop-encoded credit card to a Bedoop sensor on the user's computer. The Bedoop data on the card leads to a database entry containing the credit card number and expiration date. The Bedoop application then sends this information (optionally after encrypting same) to the web site with instructions to purchase the depicted product.

(Impulse purchases are commonly deterred by the hurdles posed between the purchase impulse and the completed purchase. This and other Bedoop applications aid in reducing such hurdles.) Product Marketing

Bedoop data relating to one product or service can be used to cross-market other products and services. Consider a consumer who purchases a pair of golf shoes. The box is Bedoop encoded. By presenting the box to a Bedoop system, the consumer is linked to a web page that presents various promotional offers. The consumer may, for example, elect to play a free round of golf at one or more identified local golf courses, or print a coupon for ten percent off any order of socks from an on-line sock merchant. (Various means can be employed to prevent multiple redemptions from a single box. One is a serial number that is tracked by the web page

or cross-marketed merchant, and only honored once. Another is identification data corresponding to the consumer that is tracked to prevent multiple redemptions.)

Product tags can likewise be Bedoop-encoded. A tag from an article of Nike apparel can lead to the Nike on-line store, where the user can buy more merchandise. If the tag is from a soccer jersey, a certain tag manipulation (e.g., rotate left) may lead the user to a special-interest soccer page, such as for the World Cup. A tag on a golf glove may lead to a website of a local golf course. Twist left to reserve a tee time; twist right to review course maps and statistics. Bedoop kiosks can be provided in retail stores to let consumers use the Bedoop features.

Travel Planning Services

After making a reservation at a resort, a consumer is typically mailed (by email or conventional mail) various confirmation information. If not already printed, the consumer can print this information (e.g., a confirmation card).

Bedoop-encoding on the printed object can lead to web-based information relating to the reservation (e.g., reservation number, the consumer's name, arrival/departure dates, etc.). If the consumer wishes to make dinner or golf reservations, this object is presented to a Bedoop system—either at the user's home, at an airport kiosk, etc. The system recognizes the object type and encoded data, and establishes a link to a remote computer that provides various information and scheduling services for the resort. By manipulating the object (or otherwise) the consumer selects desired dinner and golf tee times. The system already has the reservation number (indexed by the UID), so tedious provision of such data is avoided.

In some embodiments, the remote computer is not maintained by the resort, but is rather maintained by an independent travel service. (The travel service may also maintain the DNS leaf node server.) The computer can present a web page (branded by the travel service or not) that offers the scheduling options desired by the user, and also presents links to other information and services (e.g., offering entry tickets to nearby attractions, and advertising nearby restaurants).

Airline tickets (or e-ticket confirmations) can be similarly encoded with Bedoop data. These items may be presented to Bedoop systems—at a traveler's home or in airports—to permit review and changing of travel itinerary, reserve hotels and rental cars, secure first-class upgrades, check the airplane's seating arrangement, review frequent flyer status, scan tourist information for the destination, etc.

Movie Tickets

As indicated earlier, movie tickets can be encoded with Bedoop data identifying, e.g., the movie title and date. When a movie viewer returns home, the ticket stub can be presented to a Bedoop system. One of the options presented by the corresponding Bedoop application can be to launch a pay-per-view screening of the just-seen movie at a discounted rate. Another is to download the movie onto a writable DVD disk at the viewer's home, perhaps serialized to permit playback only on that viewer's DVD player, or enabled for only a few playbacks, etc. (again, likely for a discounted fee). Still another option is to present web-delivered video clips from the movie. Another is to offer related merchandise for purchase, possibly at discount to retail. (These features may be available for only a limited period after the date encoded on the ticket stub.) Another is to alert the consumer to upcoming movies of the same genres, or with the same director or stars, or released by the same studio. Still another is to direct a web browser to an on-line ticket merchant for tickets to other movies. The consumer may navigate among these options by manipulating the ticket stub, or otherwise.

The same, or related, options can likewise be provided in response to Bedoop data detected from a book jacket presented to a Bedoop system.

Video Recording

A video recording device can be programmed to record a broadcast program by presenting a Bedoop sensor with a printed promotion for the program (e.g., an advertisement in a newspaper or TV Guide). Bedoop-encoded within the printed document is data by which the Bedoop system (which may be built into the video recorder or separate) can set the recording time, date, and channel.

Set Top Boxes

Many entertainment-related applications of Bedoop data can be implemented using television set top boxes. Such boxes include processors, and typically include a return channel to a control facility. The provision of a Bedoop chip and optical sensor can vastly increase the functionality these devices presently provide.

Special Event Tickets

Consider a ticket to a basketball game. By presenting the ticket to a Bedoop system, a user may access the web site of either team so as to review recent scores and statistics. The user may also obtain a web-based virtual tour of the arena, and review seating maps. Tickets for upcoming games may be ordered, as well as pay-per-view games and team souvenirs. For high-priced tickets, the user may be entitled to premium web features, such as on-line text-, audio-, or video-chat session with a team star on the day before the game.

Unlike conventional tickets, Bedoop-encoded tickets need not limit the user to a predetermined seat. While the ticket may be printed with a nominal seat, the user may present the ticket to a Bedoop sensor and access a web site at which a different seat can be reserved. On attending the event, the consumer presents the ticket to a Bedoop sensor that reads the ticket UID and looks up the seat assignment most-recently picked by the consumer. It then prints a chit entitling the consumer to take the seat earlier selected from the transactional web site.

Signet Rings

Signet rings have historically been used to indicate a person's identity or office. Such rings, or other items of personal jewelry, can be encoded with Bedoop data (either by texturing or printing) and presented as necessary to Bedoop systems. The extracted Bedoop data can lead to a secure web site indicating the person's name and other information (i.e., a web site that has anti-hacking measures to prevent illicit change of the stored identification information). Such a signet ring can be presented to Bedoop systems that require a high-confidence confirmation of identity/authorization before proceeding with a Bedoop function.

Post-It® Notes

Pads of Post-It® notes, or other pads of paper, can be marked by the manufacturer (either by texturing, water-marked tinting, ink-jet spattering, etc.) to convey steganographic data (e.g., Bedoop data). When such a note is presented to a Bedoop system, the system may launch an application that stores a snapshot of the note. More particularly, the application may mask the note-portion of the image data from the other image data, virtually re-map it to a rectangular format of standardized pixel dimensions, JPEG-compress the resulting image, and store it in a particular computer subdirectory with a name indicating the date of image acquisition, together with the color and/or size of the note. (These latter two data may be indicated by data included in the Bedoop payload.) If the color of the note is

indicated by digital data (e.g., in the file name), then the image itself may be stored in grey-scale. When later recalled for display, the white image background can be flooded with color in accordance with the digital color data.

The Bedoop system may buffer several past frames of image data. When the object is recognized as a Post-It note whose image is to be saved, the system may analyze several such frames to identify the one best-suited for storage (e.g., check the spatial frequency content of the note as imaged in each frame, to identify the one with the finest detail), and store that one.

When a Post-It note is recognized by the Bedoop system, the system may emit a confirmation tone (or other response) to indicate that the object has been recognized, but not immediately execute the snapshot operation. Instead, the system may await a further instruction (e.g., gesture) to indicate what operation is desired.

By moving the note towards the sensor, for example, the user can signal that a snapshot operation is to be performed. (This closer presentation of the note may also permit the imaging system to capture a more detailed frame of image data.)

By moving the note away, the system may respond by reading, decompressing, and displaying the six most-recently stored Post-It note images, in tiled fashion, on the computer screen. The individual notes can be displayed at their original dimensions, or each can be re-sized to fill the full height or width of a tile. A user interface control (responsive to gestures, mouse operation, keyboard scroll arrows, etc.) allows the user to scroll back in time to any desired date.

The full 64-bit Bedoop payload of other embodiments may not be needed for Post-It notes. In the just-given example, for example, the Bedoop system responds to all Post-It notes in the same fashion. Thus, an abbreviated Bedoop format that indicates simply 'I'm a Post-It note, yellow, size 3"x3"' can suffice. The twelve bit CLASS ID, with eight further bits to indicate color/size combinations, may be sufficient. Reducing the payload permits it to be more robustly encoded on small objects. (As noted below, Bedoop decoding systems can look for several different data formats/protocols in trying to extract Bedoop data from an object.)

Alignment of Documents for Other Purposes

While the just-described pre-marked paper triggered a Bedoop response when presented to a Bedoop sensor (i.e., take a snapshot of the paper), the markings can be used for purposes other than to trigger Bedoop responses. Regardless of the particular data with which the paper is encoded, the embedded subliminal graticules, or other steganographically-encoded registration data, can be used by other applications to correct misalignment of scanned data. In a photocopier, for example, a document need not be placed exactly squarely on the glass platen in order to yield a properly-aligned photocopy. The scanner scans the skewed document and then detects the steganographic registration markings in the resulting scan data. This data is then processed to virtually re-register same, so that the registration markings are in a desired alignment. The processed scan data is then provided to the xerographic reproduction unit to yield a photocopy in which the skew effect is removed.

The same technique is likewise applicable to video recorders, digital cameras, etc. If such a device images an object (e.g., a photograph) with steganographic registration markings, these markings can be used as a guide in re-registering the resulting data to remove mis-alignment effects.

Postal Mail Information

Many contexts arise in which data to be presented to a consumer is valuable only if timely. The postal service mail is ill-suited for some such information due to the latency between printing a document, and its ultimate delivery to a recipient. Bedoop principles, however, allow the recipient to take a postal object that was printed well before delivery, and use it on receipt (i.e., present to a Bedoop system) to receive up-to-the-minute information. In this and other embodiments, the Bedoop data can also uniquely identify the addressee/recipient/user, so the web site can present data customized to that user.

Distributors of printed advertising can reward Bedoop-driven consumer visits to their web sites by issuing digital tokens or coupons that can be redeemed for premiums, cash-back, etc. Every millionth visitor wins a million pennies (with appropriate safeguards, e.g., preventing more than one entry an hour).

Classes of Bedoop Encoding

The above-described embodiments focused on use of Bedoop data after decoding. Additional insight may be gained by examining the earlier part of the process—encoding.

Encoding can be performed in many contexts, which may be conceptualized as falling into three broad classes. The first is static marking, in which a document designer, prepress service bureau, advertising agency or the like embeds Bedoop data. The second is dynamic marking, in which automated systems encode, or vary, Bedoop data “on the fly.” Such systems can tailor the Bedoop data to particularly suit the context, e.g., to the moment, place, user, etc. The third is consumer marking, in which Bedoop data is added to a document at the time of printing.

The second class of encoding enables features not available from the first. Consider an American Express travel web page with information about travel to Hawaii. A DNS leaf node server points to this page in response to certain Bedoop data—e.g., data encoded in a magazine photograph of a Hawaiian beach scene.

Actually, all Bedoop data having a certain CLASS and DNS ID may lead to this web page, irrespective of the UID data. If the magazine photo is encoded with a particular “don’t care” UID field (e.g., 111111111111111111111111), this may signal the originating Bedoop system—or any intervening system through which the Bedoop data passes—that arbitrary data can be inserted in the UID field of that Bedoop packet. The originating Bedoop system, for example, can insert a dynamically-configured series of bits into this field. Some of these bits can provide a profile of the user to the remote server, so that the Bedoop response can be customized to the user. (The user would naturally preapprove information for such use so as to allay privacy concerns.)

As one example, the local Bedoop system can set the least significant bit of the UID field to a “0” if the user is male, or to a “1” if the user is female. The next four bits can indicate the user’s age by one of sixteen age ranges (e.g., 3 or less, 4-5, 6-7, 8-9, 10-11, 12-13, 14-15, 16-17, 18-20, 21-24, etc.).

Alternatively, or in addition, the local Bedoop system can stuff the don’t-care UID field (all of it, or in part) with signature data tending to uniquely identify the local Bedoop system (e.g., system serial number, a hash code based on unchanging data unique to that system, etc.). By reference to such data, the remote server can identify repeat visits by the same user, and can tailor its responses accordingly (e.g., by recalling a profile of information earlier entered by the user and stored at the remote server, avoiding the need for data re-entry).

More on Optical Input Devices

It is expected that image input devices will soon become commonplace. The provision of digital cameras as built-in components of certain computers (e.g., the Sony Vaio laptops) is just one manifestation of this trend. Another is camera-on-a-chip systems, as typified by U.S. Pat. No. 5,841,126 and detailed in Nixon et al., “256x256 CMOS Active Pixel Sensor Camera-on-a-Chip,” IEEE J. Solid-State Circuits, Vol. 31(12), pp. 2046-2051 (1996), and Fossum, “CMOS Image Sensors: Electronic Camera-on-a-Chip,” IEEE Transactions of Electron Devices, vol. 44, No. 10, October 1997. Still another is head-mounted cameras (as are presently used in some computer-augmented vision systems). These and other image input devices are all suitable for use in Bedoop systems.

Camera-on-a-chip systems can be equipped with Bedoop detector hardware integrated on the same chip substrate. This hardware can be arranged to find and decode Bedoop data from the image data—notwithstanding scale, rotation, differential scaling, etc. Gestural decoding can also be provided in hardware, with the resulting data output in packet form on a serial output bus. Such a chip can thus provide several outputs—image data (either in raw pixel form, or in a data stream representing the image in one of various image formats), 64 bits of Bedoop data (serially or in parallel), and decoded gesture data.

In other embodiments, the Bedoop detector (and/or the gestural decoder) can be on a substrate separate from the camera system.

To accommodate different Bedoop data formats and protocols, the hardware can include RAM or ROM in which different format/protocol information is stored. (These different formats/protocols can relate, e.g., to Bedoop systems employing different data payload lengths, different subliminal grids, different encoding techniques, etc.) As the Bedoop system stares out and grabs/analyzes frames, each frame can be analyzed in accordance with several different formats/protocols to try and find a format/protocol that yields valid Bedoop output data.

Movable Bedoop Sensors

Although the illustrated Bedoop systems are generally stationary, they need not be so. They can be portable. Some such systems, for example, employ palmtop computers equipped with optical sensor arrays. If the palmtop is provided with live network connectivity (e.g., by wireless), then Bedoop applications that rely on remote computers can be implemented just as described. If the palmtop is not equipped with live network connectivity, any Bedoop applications that rely on remote computers can simply queue such communications, and dispatch same when the palmtop next has remote access (e.g., when the palmtop is next placed in its recharger and is coupled to a modem through which internet access can be established).

Another variant is a Bedoop sensor that is movable around a desk or other work-surface, like a mouse. Such a sensor can be coupled to the associated computer by cabling, or a wireless interface can be used. The peripheral may be arranged for placement on top of an item in order to read digital data with which the object is marked. (Built-in illumination may be needed, since the device would likely shadow the encoding.) Some forms of such peripherals are adapted to serve both as general purpose digital cameras, and also as Bedoop sensors.

Such a peripheral would find many applications. In “reading” a magazine or book, for example, it may be more intuitive to place a Bedoop reader “on” the object being read, rather than holding the object in the air, in front of a

Bedoop sensor. This is particularly useful, e.g., when a magazine page or the like may have several differently-encoded Bedoop sections (corresponding to different articles, advertisements, etc.), and the user wants to assure that the desired Bedoop-encoded section is read.

The "bookmark" paradigm of internet browsers might be supplemented with paper bookmarks, e.g., Bedoop data encoded on one or more pages of paper. To direct a browser to a particular bookmarked destination, the peripheral is simply placed on top of the page (or part thereof) that is marked with the corresponding Bedoop data. A user may print a "Map" comprised of postage stamp-sized regions tiled together, each of which regions represents a favorite web destination.

Such a map may be printed on a mouse pad. Indeed, mouse pads with certain maps pre-encoded thereon may be suitable as promotional materials. A company may offer to print a family photograph on such a pad. Encoded within the photograph or the pad texture are addresses of web sites that have paid a fee to be accessible in this manner on a user's desk.

Like mice—which are provided with buttons, roller wheels, and roller buttons in addition to X-Y encoders—movable Bedoop encoders can likewise be provided with auxiliary switches and roller inputs to complement the data input provided by the optical sensor. Indeed, some embodiments integrate the functions of Bedoop peripheral with a mouse. (The undersides of mice are generally under-utilized, and can readily be equipped with an image sensor.) Gestural input can readily be provided by such a peripheral—in this context moving the sensor rather than the object.

Watermarking Techniques

There are nearly as many techniques for digital watermarking (steganographic data encoding) as there are applications for it. The reader is presumed to be familiar with the great variety of methods. A few are reviewed below.

The present assignee's prior application Ser. No. 09/127,502, filed Jul. 31, 1998, shows techniques by which very fine lines can be printed on a medium to slightly change the medium's apparent tint, while also conveying digital data. Commonly-owned application Ser. No. 09/074,034, filed May 6, 1998, details how the contours of printed imagery can be adjusted to convey digital data. (That technique can be applied to printed text characters, as well as the line art imagery particularly considered.) The assignee's U.S. Pat. No. 5,850,481 details how the surface of paper or other media can be textured to convey optically-detectable binary data. The assignee's U.S. Pat. No. 5,841,886 and 5,809,160 detail various techniques for steganographically encoding photographs and other imagery.

Some watermarking techniques are based on changes made in the spatial domain; others are based on changes made in transformed domains (e.g., DCT, wavelet). Watermarking of printed text can be achieved by slight variations to character shape, character kerning, line spacing, etc.

Data glyph technology, as detailed in various patents to Xerox, is usable in many of the applications detailed herein.

The foregoing is just a gross under-sampling of the large number of watermarking techniques. The artisan is presumed to be familiar with such art, all of which is generally suitable for use in the applications detailed herein.

More generally, essentially any data encoding method that permits recovery of the encoded data from optical scan data can be employed. Bar codes (1D and 2D) are but the most familiar of many such optically-detectable data encoding techniques.

Conclusion

Having described and illustrated the principles of our invention with reference to illustrative embodiments, it should be recognized that the invention is not so limited.

For example, while certain of the embodiments were illustrated with reference to internet-based systems, the same techniques are similarly applicable to any other computer-based system. These include non-internet based services such as America Online and Compuserve, dial-up bulletin board systems, etc. Likewise, for internet-based embodiments, the use of web browsers and web pages is not essential, other digital navigation devices and other on-line data repositories can be similarly accessed.

Similarly, while the details of the preferred Bedoop system were particularly given, the underlying principles can be employed in numerous other forms.

For example, one other form is to steganographically encode physical objects with Digital Object Identifiers (DOIs). The Center for National Research Initiatives and the Digital Object Identifier Foundation (www.doi.org) have performed extensive work in establishing an infrastructure by which digital objects can be distributed, tracked, and managed. Some of this same infrastructure and technology can be adapted, in accordance with the teachings provided above, to associate new functionality with physical objects.

Another form is not to reference a remote data repository by data embedded on an object, but instead to encode the ultimate data directly on the object. A photograph, for example, can be literally encoded with a telephone number.

On presenting the photograph to an optical sensor on the telephone, the telephone can analyze the optical information to extract the telephone number, and dial the number, without the need for any external data. Similarly, a printed office document (e.g., spreadsheet) can be encoded with the path and file name of the corresponding electronic file, obviating the need for indirect linking (e.g., to a database to correlate a UID to a computer address). Most of the above-described embodiments are suitable for such direct encoding of the related data.

In the business card example given above, the detailed techniques can be supplementary to existing optical character recognition techniques. That is, the image data from an optical sensor can be applied both to a Bedoop decoder and to an OCR system. Text characters discerned by the OCR system can be entered directly into a contacts manager personal database. The techniques employed in the Bedoop system to locate the encoded object and handle visual distortion (e.g., the visual artifacts due to scale, rotation, etc.) can advantageously be used in OCR detection as well, permitting extraction of the OCR information without careful placement of the card.

While certain of the foregoing embodiments made reference to ink-jet printing, similar advantages can often be obtained with other printing technologies, e.g., laser/xerographic printing, offset printing, etc.

In the foregoing embodiments, Bedoop decoding generally proceeded from image data obtained from a physical object. However, in some contexts, it is advantageous to Bedoop-decode image data provided electronically, e.g., over the internet.

Likewise, while the foregoing embodiments generally relied on Bedoop image sensors that stared out for an object at an expected point, in alternative embodiments, sensors that seek rather than stare can be employed (as was illustrated above in connection with the elevator example).

Similarly, while the illustrated embodiments generally employed sensors that repeatedly grabbed frames of image data, this need not be the case. Single frame systems, such

as flatbed scanners, and video systems arranged to grab single frames—with or without TWAIN interfaces—can alternatively be used.

As indicated above, while steganographic encoding of the digital data is used in the preferred embodiments, visible forms of digital encoding—such as bar codes—can naturally be employed where aesthetic considerations permit.

In certain of the embodiments, digital data conveyed by means other than optical can be used. Electromagnetic detection (e.g., of the sort used in proximity-based card-access systems) can be arranged to decode digital data, permitting “at-a-distance” reading of data from physical objects, just as in the foregoing embodiments.

Since the Bedoop image sensors typically acquire plural frames of data, the extraction of the digital data can be based on more than a single image frame. More confidence in the results may be accumulating decoded data over several frames. Moreover, movement of the object within the sensor’s field of view may permit the system to acquire information from other perspectives, etc., enhancing system operation.

While the preferred embodiments employ 2-D image sensors (e.g., CCDs), other optical sensing technology can alternatively be employed. Supermarket laser scanners, for example, can read bar-code data. Raster-scanning of such systems can permit acquisition of 2-D data (either in bit-mapped form, or grey-scale).

While the illustrated embodiments used a 12/24/24 bit protocol for CLASS/DNS/UID data, other arrangements can of course be used. In some applications it is advantageous for the protocol to more nearly match those commonly used for internet communications. For example, IP addresses for internet Domain Name Servers (DNS) are presently 32 bits, with extension to 64 or 128 bits foreseen in the near future. The DNS field in Bedoop systems can be follow the internet standard.

Some embodiments can advantageously employ texture-based Bedoop encoding of objects. Bedoop texturing can be effected by various means, including pressure rollers, chemical or laser etching, etc.

While the foregoing embodiments have generally employed planar objects to convey the digital encoding, this need not be the case. Objects of other shapes can likewise be employed. Some shapes present relatively straightforward image processing tasks. Data imaged from a soft drink can or other cylindrical surface, for example, is fairly easy to remap using known geometrical transforms so as to essentially “unwrap” the printing from the can. Other geometries can present more complex re-mappings, but are likewise generally within the capabilities of the artisan. (Such remapping is facilitated by encoding in the data certain reference markings, such as subliminal graticules, etc. The unknown 3D shape of the object being imaged can usually be inferred from the apparent warping of the reference markings in the 2D image data generated by the scanner. Once the warping is characterized, it is generally straightforward to un-warp so as to prepare the image data for decoding.)

It was once popular to predict that paper documents would be replaced with electronic media. In hindsight, electronic media may be recognized as a poor surrogate for paper. Electronic media conveys information flawlessly, but is lacking in experiential attributes. We can hold paper, stack it, own it, deface it, give it, guard it, etc. It provides an opportunity for physical dominion entirely lacking with electronic media.

From the foregoing discussion it can be seen that, rather than replacing paper with electronic media, perhaps the

future lies in giving paper digital attributes—hybridizing the physical experience of paper with the technical advantages of digital media. Such an arrangement makes available a great wealth of new functionality, now accessible through familiar paper items, rather than through a “computer input peripheral.”

To provide a comprehensive disclosure without unduly lengthening this specification, applicant incorporates by reference the patents, applications, and publications identified above.

In view of the many embodiments to which the principles of my invention may be applied, it should be recognized that the detailed embodiments are illustrative only and should not be taken as limiting the scope of my invention. Rather, I claim as my invention all such embodiments as fall within the scope and spirit of the following claims, and equivalents thereto.

APPENDIX A

PAPER-BASED CONTROL OF COMPUTER SYSTEMS

Related Application Data

This application is a continuation-in-part of co-pending application Ser. No. 09/130,624, filed Aug. 6, 1998, which is a continuation of application Ser. No. 08/508,083 (now U.S. Pat. No. 5,841,978).

The subject matter of this application is generally related to that in all of the assignee’s other patents and applications, e.g., U.S. Pat. Nos. 5,841,886, 5,832,119, 5,822,446 and 5,841,978, and the application entitled Methods and Systems Employing Digital Watermarking, filed on even date herewith.

Field of the Invention

The present invention relates to use of printed documents to control computer systems. Exemplary documents include business cards, advertisements, and identification badges, but the invention is not so limited.

Background and Summary of the Invention

Over the past century, business cards have formed part of business ritual. Functionally, they serve as a record of an encounter, and detail means by which the giver may be contacted (address, phone, etc.).

Business cards have changed, essentially, not at all in response to the advent of computers. Some accommodation has been made for business cards on the computer side, in the form of specialized scanner and optical character recognition tools by which textual data printed on cards can be read and entered into personal productivity software tools (e.g. contact managers, address books, datebooks, personal information managers, etc.). However, the data transferred into the personal productivity software is static and unchanging.

In accordance with one embodiment of the present invention, the textual information on a business card is supplemented with steganographically-encoded, multi-bit binary data. This latter data does not significantly distract from the visual aesthetics of the card (as would a bar code or the like), yet can be used by an associated computer to initiate a link to an internet site corresponding to the business card giver. At the site, the recipient of the card may gain access to the giver’s schedule, and other information that changes over time. (Such information may not generally be available over the internet to persons without the card data.)

The foregoing and additional features and advantages of the present invention will be more readily apparent from the following detailed description, which proceeds with reference to the accompanying drawings.

Brief Description of the Drawings

FIG. 1 (omitted) shows a flow chart of a process according to one embodiment of the present invention.

Detailed Description

Digital watermarking is a quickly-growing field of endeavor, and many techniques are known. Generally, all seek to steganographically convey multi-bit data ancillary to some other signal or medium.

The present assignee's prior application Ser. No. 09/127,502, filed Jul. 31, 1998, shows techniques by which very fine lines can be printed on a medium to slightly change the medium's apparent tint, while also conveying digital data. Commonly-owned application Ser. No. 09/074,034, filed May 6, 1998, details how the contours of printed imagery can be adjusted to convey digital data. (That technique can be applied to printed text characters, as well as the line art imagery particularly considered.) Applicant's U.S. Pat. No. 5,850,481 details how the surface of paper or other media can be textured to convey optically-detectable binary data. Applicant's U.S. Pat. Nos. 5,841,886, 5,809,160, and the priority applications detailed above, detail various techniques for steganographically encoding photographs and other imagery.

Three papers by Brassil et al show other techniques for conveying watermark data by slight changes to printed text, "Electronic Marking and Identification Techniques to Discourage Document Copying," Proceedings of INFOCOM '94 Conference on Computer, IEEE Comm. Soc Conference, Jun. 12-16, 1994, pp. 1278-1287; "Hiding Information in Document Images," November, 1995, 7 pages, AT&T Bell Laboratories Technical Report (available at <http://ftp.research.att.com/dist/brassil/1995/ciss95.ps.Z>); and "Document Marking and Identification using Both Line and Word Shifting," INFOCOM '95 (available at <http://ftp.research.att.com/dist/brassil/1995/infocom95.ps.Z>).

The foregoing is just a sampling of the large literature on watermarking. The artisan is presumed to be familiar with such art, all of which is generally suitable for use with the novel concepts detailed below.

In accordance with any of the known watermarking techniques, a business card is steganographically encoded with plural bit data. At least part of this data identifies an internet address or web site at which data about the giver of the card is stored. If sufficient bits can be encoded into the business card, the address can be encoded literally, e.g., by ASCII or binary numeric encoding. Alternatively, to reduce the data payload, an abbreviated form of address. One example of such an abbreviated form is a Unique Identifier (UID) which can be, e.g., a 24-bit value.

Desirably, the steganographic encoding is tailored to facilitate decoding in the presence of arbitrary rotation or scale distortion of the card introduced during scanning. (Some such techniques are shown, e.g., in applicant's related patents identified above. Others are known to artisans.)

As shown in FIG. 1 (omitted in this appendix), the card is scanned (e.g., by use of conventional opto-electronic devices, such as a scanner or a digital camera). The output data is then optionally processed to account for any skew or

scale factor. The plural-bit digital data is then decoded and stored, e.g., in personal productivity software.

(Although not particularly shown in FIG. 1, it is expected that the detailed process will often be supplemental to known OCR-reading of business cards, and entry of the textual data into personal productivity software. That is, the scan data is processed both by OCR techniques, and by steganographic decoding techniques, and the results of both operations stored in a data structure or other memory for later reference.)

The steganographically-decoded plural-bit data is provided to a web browser or other internet appliance and used to initiate a link to a remote computer over the internet's network of computers. If the remote address was literally encoded in the business card, that address is used directly. If an abbreviated form of address was encoded, an additional step may be required.

If a UID was encoded in the card, rather than a literal address, the web browser might consult an index to correlate the UID to an address. The index could be a table or other data structure stored on the user's local computer, but more commonly is a remote name server database to which the browser links as a default when processing business card UIDs. Data obtained from the index is then used to complete the linking to the ultimate destination. (In addition to reducing the business card payload, such linking through an index, e.g., by a UID, offers flexibility in that the ultimate destination can be moved to other server sites as needed, with just a simple update to the index. Alternatively, all business cards encoded with the former address would be rendered obsolete if the site were relocated.)

At the ultimate site, the user is presented with whatever information the business card giver chooses to provide, including biographical information, photos, promotional offers or advertisements relating to the card-giver's business (or relating to enterprises to whom the card-giver has rented screen space), etc., etc. In one embodiment, the giver's site is linked to the giver's personal productivity tool(s) and permits viewing, e.g., of calendar information (showing where the business card giver is scheduled to be today, or for the rest of the week, month, etc.).

Typically, this calendar information is not available to casual web browsers; the steganographically decoded data from the business card includes some authentication data (akin to a password) that permits access to otherwise restricted data. This authentication data can take the form of a web page address to which no publicly-accessible link points, a password that is separately presented to the web server by the user's browser after a link is established, or other known technique.

In one form of the invention, the giver of business cards may have several differently-encoded cards, each with a different level of access authorization. Thus, some cards may access a biographical page without any calendar information, other cards may access the same or different page with access enabled to today's calendar, and still other cards may access the same or different page with access enabled for the card-giver's complete calendar.

The reference to business cards and personal calendars is illustrative only. The invention is more widely applicable. Going back a century, "calling cards" were used by persons whose interests were strictly social, rather than business. The principles of the present invention can similarly be applied. Tectagers can carry small cards that can be exchanged with new acquaintances to grant access to private dossiers of personal information, favorite music, artwork

video clips, etc. The cards can be decorated with art or other indicia that can serve purposes wholly unrelated to the linking data steganographically encoded therein.

Even the "card" paradigm is too restrictive. The same techniques can be applied to any object. A music CD cover can be encoded to point to a promotional site associated with the music artist. A book jacket can link to a similar site. Printed advertising distributed through the US mail (cards, magazines, etc.) can be encoded to point to related web-based promotional sites. (Sponsors of such advertising or other sites can reward visits to their internet site by issuing visitors digital tokens or coupons that can be redeemed for premiums, cash-back, etc., either for any such visit, or only if the visit was effected through the portal of a steganographically-encoded printed medium.)

Many contexts arise in which data to be presented to a consumer is valuable only if timely. The postal service mail is ill-suited for some such information due to the latency between printing a document, and its ultimate delivery to a recipient. The principles of the present invention allow the recipient to take a steganographically-encoded data object (card, etc.) that was printed well before delivery, and use it on receipt to receive up-to-the-minute information. (In this and other embodiments, the steganographically-encoded data can also include data uniquely identifying the recipient/user, so the web site can present data customized to that user.)

The present technology also has application in access control systems. An identification badge (either with photo or graphics, or with text alone) can be encoded with steganographically access control data (e.g., access codes or digital keys) that is recognized by optical-scanner-equipped locks and the like, permitting access by authorized persons to restricted areas or restricted services (e.g., computer privileges). Given the low cost of media and printing (as compared with other access control technologies), the cards can be issued on a daily, weekly, or other frequent interval, and the access control system can be programmed to permit access in response to such cards only for the pre-set limited period. Lost cards soon lose their threat.

Tickets to sporting events, concerts, and other events can be steganographically encoded to permit the bearer to access premium web content available only to those who have purchased tickets (e.g., an on-line text-, audio-, or video-chat session with the featured performer or sports star the day before the event). Alternatively, the encoded data may link to a transactional site. In some such embodiments, the ticket is printed with a nominal show data and seat assignment, but also includes a UID in addition to the encoded address of an associated transactional ticket site. The user then can visit the transactional web site to change seating (or date). On attending the event, the consumer presents the ticket to a steganographic decoder apparatus that discerns the UID and looks up the seat assignment most-recently picked by the consumer. It then prints a chit entitling the consumer to take the seat earlier selected on-line.

The reference to "scanning" of objects naturally brings to mind images of desktop flatbed scanners, or multi-function hydra devices. While such devices can be used—together with convention digital cameras (including video cameras)—the inventors foresee that image input devices will soon be much more commonplace. The provision of digital cameras as built-in components of certain computers (e.g., the Sony Vaio laptops) is just one manifestation of this trend. Another is camera-on-a-chip systems, as typified by U.S. Pat. No. 5,841,126 and detailed in Nixon et al., "256x

256 CMOS Active Pixel Sensor Camera-on-a-Chip," IEEE J. Solid-State Circuits, Vol. 31(12), pp. 2046-2051 (1996), and Fossum, "CMOS Image Sensors: Electronic Camera-on-a-Chip," IEEE Transactions of Electron Devices, Vol. 44, No. 10, October 1997. Still another is head-mounted cameras (as are presently used in some computer-augmented vision systems). These and other image input devices can all be used in connection with the present invention.

To facilitate embodiments of the present invention, a prior art camera-on-a-chip system can be modified to also include a steganographic watermark detector on the same semiconductor substrate. Such a chip—in addition to providing image output data—can also analyze the image data to discern any steganographically encoded data, and produce corresponding output data. (Again, such analysis desirably includes correction for scale and rotation factors, so precise positioning of the object being "read" is not essential for correct decoding.)

To provide a comprehensive disclosure without unduly lengthening this specification, applicants incorporate by reference the patents, applications, and publications identified above.

APPENDIX B

METHODS AND SYSTEMS EMPLOYING DIGITAL WATERMARKING

Field of the Invention

The present invention relates to applications of digital watermarking in conjunction with audio, video, imagery, and other media content.

Background

Watermarking (or "digital watermarking") is a quickly growing field of endeavor, with several different approaches. The present assignee's work is reflected in U.S. Pat. Nos. 5,841,978, 5,768,426, 5,748,783, 5,748,763, 5,745,604, 5,710,834, 5,636,292, 5,721,788, and laid-open PCT applications WO97/43736 and WO99/10837. Other work is illustrated by U.S. Pat. Nos. 5,734,752, 5,646,997, 5,659,726, 5,664,018, 5,671,277, 5,687,191, 5,687,236, 5,689,587, 5,688,570, 5,572,247, 5,574,962, 5,579,124, 5,581,500, 5,613,004, 5,629,770, 5,461,426, 5,743,631, 5,488,664, 5,530,759, 5,539,735, 4,943,973, 5,337,361, 5,404,160, 5,404,377, 5,315,098, 5,319,735, 5,337,362, 4,972,471, 5,161,210, 5,243,423, 5,091,966, 5,113,437, 4,939,515, 5,374,976, 4,855,827, 4,876,617, 4,959,515, 4,963,998, 4,969,041, and published foreign applications WO 98/02864, EP 822,550, WO 97/39410, WO 96/36163, GB 2,196,167, EP 777,197, EP 736,860, EP 705,025, EP 766,468, EP 782,322 WO 95/20291, WO 96/26494, WO 96/36935, WO 96/42151, WO 97/22206, WO 97/26733.

Most of the work in watermarking, however, is not in the patent literature but rather in published research. In addition to the patentees of the foregoing patents, some of the other workers in this field (whose watermark-related writings can be found by an author search in the INSPEC database) include I. Pitas, Eckhard Koch, Jian Zhao, Norishige Morimoto, Laurence Boney, Kinco Matsui, A. Z. Tirkel, Fred Mintzer, B. Macq, Ahmed H. Tewfik, Frederic Jordan, Naohisa Komatsu, and Lawrence O'Gorman.

The artisan is assumed to be familiar with the foregoing prior art.

In the present disclosure it should be understood that references to watermarking encompass not only the assign-

41

ee's watermarking technology, but can likewise be practiced with any other watermarking technology, such as those indicated above.

Watermarking has various uses, but the present specification details several new uses that provide functionality and features not previously available.

Brief Description of the Drawings (omitted from this Appendix)

FIG. 1 is a diagram showing the participants, and channels, involved in the distribution of music.

FIG. 2 shows a conceptual model of how music artists, record labels, and E-Music distributors can all interact with a Media Asset Management System, of which several are detailed in the following specification.

Detailed Description

For expository convenience, much of the following discussion focuses on music, but the same principles and techniques are largely or wholly applicable to other source data, whether non-music audio, video, still imagery, printed materials, etc.

Music Asset Management

Referring to the figures, the music distribution process begins with a creative artist 10. The artist's music has traditionally been distributed by a record label 12. (While the following discussion refers to distribution through such a label, it should be understood that such distribution can just as well be effected directed under the artist's control, without a record label intermediary.)

In traditional distribution 14, the record label produces tangible media, such as records, tapes, videos (e.g. music videos), and CDs 16. These media are physically distributed to end-consumers 18. Additionally, the label 12 distributes the music media to outlets 20, such as radio and TV stations, cable and satellite systems, etc., which broadcast (or narrowcast) the artist's work to an audience. Distribution through such media outlets may be monitored by playout tracking services. Playout tracking data, collected by firms including Arbitron, Nielsen, ASCAP, BMI, etc., can be used to compute royalty payments, to verify broadcast (e.g. for advertising), etc.

Increasingly, the distribution of the music to the media outlets is performed electronically. Such distribution first took the form of analog audio over high quality landlines or satellite channels. Digital audio quickly supplanted analog audio in such distribution channels due to higher fidelity.

More recently, distribution of the music from the record labels to the media outlets has occurred over secure links, now including the internet. Such security was first provided simply by scrambling the audio signal or data. More sophisticated "container"-based systems are now coming into vogue, in which the audio is "packaged" (often in encrypted form) with ancillary data.

Electronic distribution of music to the consumer is also gaining popularity, presently in the MP3 format primarily. The music providers may deal directly with the public, but more commonly effect such consumer distribution through a newly emerging tier of digital media outlets, such as internet sites that specialize in music. From such sites, consumers can download digital audio files into personal digital audio players. (The Diamond Rio, and the Audible MobilePlayer devices are some of the first of what will doubtless be a large number of entrants into this personal internet audio appliance market.) Or the downloaded data can be stored by the

42

consumer-recipient onto any other writeable media (e.g. hard disk, CD, DVD, tape, videotape, etc.). Typically a personal computer is used for such downloading, but this intermediary may be dispensed with by coupling next generation of personal audio appliances to an internet-like link.

The data downloaded by the consumer can be stored either in the native digital format, translated into another digital format (which translation may include decryption), converted into analog and recorded in analog form, etc.

Unauthorized copying or use of the music can occur anywhere in the foregoing channels. However, one of the greatest risks occurs once the music has been delivered to the consumer (whether by tangible media, by traditional broadcast media outlets, by emerging digital distribution, or otherwise).

The general idea of embedding auxiliary data into music (i.e. watermarking) has been widely proposed, but so far has been of limited applicability.

For example, GoodNoise is planning to embed a digital signature—termed a multimedia identifier, or MMI—in its MP3 music. MMI will register the song and its author with a licensing number. In addition to providing information about the songwriter and distributor, this digital encoding may also include lyrics, liner notes, and other information. But all of the proposed uses serve only to convey information from the distributor to the consumer; use for "tracking" is actively disclaimed. (Wired News, "GoodNoise Tags MP3 Files," Feb. 3, 1999.)

The Genuine Music Coalition—a partnership of various companies in the music distribution business—likewise has announced plans to employ watermarking of MP3 music. The watermarking technology, to be provided by Liquid Audio, will convey data specifying the artist or producer contact, copyright data, and a number to track ownership. The Coalition hopes that the provision of this embedded information will help thwart piracy. Industry observers believe Liquid Audio will next introduce playback technology only plays audio in which its watermark is detected. (Wired News, "Liquefying MP3," Jan. 23, 1999.)

A similar initiative has been announced by the Recording Industry Association of America (RIAA). Termed the Secure Digital Music Initiative (SDMI), the program seeks to define a voluntary specification that will assure proper compensation to those who produce and distribute music. One element of the system will likely be a watermarking component. (Dow Jones Newswire, "Spurred By Maverick Technology, Music Industry Eyes Web," Dec. 31, 1998.)

Yet another initiative has been announced by Solana and ASCAP. Other companies promoting watermarking for music include Aris Technology, MCY.com, and AudioSoft.

The watermark payload can represent various types of data. An exemplary payload includes data relating to the artist, distribution entity, title, and copyright date/proprietor. Additionally, the payload can include a digital object identifier—an ISBN-like number issued by a central organization (e.g. a rights management organization) to uniquely identify the work.

Such payload data can be encoded literally (e.g. the title by a series of ASCII characters, etc.). In other embodiments, codes or abbreviations can be employed—with each code having a known meaning. In still other embodiments, the data can be meaningless by itself, but may serve as a key (e.g., a Unique Identifier, or UID) into a remote data database or repository. An example of such a remote data repository is a web site at a Master Global Address (MGA) associated with content, as detailed below.

43

An exemplary data payload may, for example, have the following format:

A	B	C	D	E	F	G	H	I		
---	---	---	---	---	---	---	---	---	--	--

Where A is a 1-byte (8-bits to a byte) ASCII string serving as a digital object identifier (which may serve as a link to a Master Global Address through a default name server, as discussed below). B is a two-byte ASCII field serving as a key into an "artist" field of the remote database. C is a three-byte ASCII field serving as a key into a "title" field of the remote database. D is a 14-bit field serving as a key into a "label" field of the remote database. E is an 8-bit integer representing the work's year of first publication (with 0 representing the year 1999). F is a 16-bit field serving as a key into a "genre" field of the remote database. G is a two-byte usage control string (detailed below). H is a streaming data channel, and I is a string of bits serving as a cyclic redundancy checksum for the foregoing. (More sophisticated error correcting checksums can, of course, be employed) This payload format totals 136 bits, exclusive of the CRC coding and the streaming data channel.

This payload is encoded repeatedly, or redundantly through the music, so that the full payload can be decoded from partial excerpts of the music.

The encoding is also desirably perceptually adaptive, so that higher energy encoding is employed where the listener is less likely to perceive the additional "noise" introduced by the encoding, and vice versa. Various techniques for perceptually adaptive encoding are known. For example, sometimes the amplitude of the encoded signal is to the instantaneous amplitude of the music. Others exploit psychoacoustic "masking" of one signal by a spectrally- or temporally- adjoining signal of higher energy. Still other approaches fill gaps in the music's spectrum with watermark energy. These and other techniques are detailed in the patents incorporated by reference.

In other embodiments, perceptually adaptive encoding is not used. In some such embodiments, no tailoring of the temporal or spectral characteristics of the watermark signal is employed. In others, the watermark signal is spectrally filtered to emphasize low frequency audio components (e.g. less than 500 Hz), high frequency audio components (e.g. higher than 2500 Hz), or mid-frequency audio components (500–2500 Hz).

The streaming data field channel (H) is a medium by which data can be conveyed from a distribution site (or other site) to the end user. Such data may be entirely unrelated to the underlying work. For example, it may serve a utilitarian purpose, such as conveying data to a memory in the consumer device to replace previously-stored data that is out-of-date. It may be a commercial channel on which bandwidth is sold for access to the consumer or the consumer's device. Essentially any purpose can be served by this streaming data field. Unlike most of the other fields, the streaming data field may not endlessly repeat the same data, but can convey data that changes with time.

Desirably, the encoding is performed in a manner permitting recovery of the watermark data even if the audio is corrupted, e.g. by format conversion, re-sampling, tape wow and flutter, compression, coding, or various forms of audio processing (e.g. filtering, pre-emphasis, re-scaling, etc.). One way to provide for such robustness is to encode a signal of known character that can be recognized through all such corruption. By identifying such known signal, the watermark signal can then be decoded. (The known signal can

44

take various forms, e.g. a synchronization signal, a marker signal, calibration signal, a universal code signal as described in applicant's patents, etc.)

In some embodiments, a watermark "dial-tone" signal is provided. This dial-tone signal is a low amplitude, relatively wideband, repetitive signal that commonly conveys only limited information (e.g. a single bit of information). Its presence in an audio signal can serve as a "do not record," or similar instruction signal. Alternatively, or in addition, the dial-tone signal can serve as an aid in "locking" to a plural-bit digital watermark signal that is also encoded in the audio. For example, the cyclical repetition of the signal can serve to identify the start of the plural-bit digital watermark signal. Or the spectrum or repetition rate of the signal can identify any temporal corruption of the audio. An exemplary such signal is detailed as a "simple universal code" in U.S. Pat. No. 5,636,292.

A track of music can be pre-authorized for specified types of use. For example, the usage control string of the watermark payload may include a six-bit field detailing the classes of devices for which the audio is authorized. Each bit would correspond to a different class of device. Class 1 devices may be personal playback devices with only analog-audio output. Class 2 devices may be personal entertainment devices capable of outputting music in digital (e.g. MP3, redbook, .WAV) format, as well as analog audio. Class 3 devices may be personal computer systems (i.e. with essentially unlimited ability for processing and outputting digital audio). Etc. A device to which such MP3 audio is provided would check the usage control string data to determine whether it is authorized to utilize the audio. A personal playback device with analog-only output, for example, would examine the first bit of the usage control string. If it was "1", the device would be authorized to use (i.e. playback) the MP3 data; if it was a "0," the device would refuse to play the music.

In addition to pre-authorization for certain classes of devices, the usage control string can also include bits indicating the number of permitted playbacks. This data can be encoded in bits seven through nine, representing eight possibilities:

- 0—no playback permitted
- 1—single playback permitted
- 2—two playbacks permitted
- 3—three playbacks permitted
- 4—four playbacks permitted
- 5—five playbacks permitted
- 6—10 playbacks permitted
- 7—unlimited playbacks permitted
- 8—refer to associated data (within the watermark, or stored at a remote site) which specifies number of permitted playbacks.

The playback device may include a non-volatile store in which the number of permitted playbacks is stored for each track of music. The device would decrement this number at the beginning of each playback.

The usage control string can also include a two-bit field (bits ten and eleven) indicating recording permissions. A value of 0 means that data corresponding to the MP3 audio (regardless of digital format) should never be made available to another digital device. A value of 1 means that the data corresponding to the MP3 data may be made available once to another digital device. A value of 2 means that the data may be made available an unlimited number of times to other digital devices. (Value 3 is reserved.)

Another data field that can be included in an audio watermark is a rating that indicates age-appropriateness.

Music with violence or sexual themes might be given a rating akin to the MPAA "PG-13" or "R" rating. Audio appliances may be programmed to recognize the rating of incoming music, and to interrupt playback if the rating exceeds a certain threshold setting. Various known techniques can be employed to assure that such settings cannot readily be changed, e.g., by juvenile listeners.

Another data field that can be included in an audio watermark is a date field. This field can indicate either the date the music was watermarked, or a date in the future on which certain rights associated with the music should change. Some consumers, for example may not wish to purchase perpetual playback rights to certain musical selections. The right to play a selection for 6 months may suffice for many consumers, especially if the price is discounted in view of the limited term. Such an arrangement would not be wholly disadvantageous to music distributors, since some consumers may end up purchasing music twice if their initial assessment of a musical selection's appeal was too short-sighted. (Naturally, the playback equipment would require a source of real-time clock data against which the date field in the watermark can be checked to ensure that the playback rights have not yet expired.)

Another of the data fields that can be included in an audio watermark specifies technical playback parameters. For example, the parameter can cause the playback appliance to apply a spectral equalization that favors bass frequencies, or treble frequencies, or mid-range frequencies, etc. Other pre-configured equalization arrangements can similarly be invoked responsive to watermark data. Likewise, the parameter can invoke special-effects provided by the playback appliance, e.g., echo effects, reverb, etc. (Again, such parameters are usually represented in an abbreviated, coded form, and are interpreted in accordance with instructions stored in a memory (either in the playback appliance, or linked thereto).)

The same data fields and principles can be applied to non-audio content. In video, for example, watermarked data can adaptively control the display monitor or playback parameters (e.g., color space) to enhance the viewing experience.

Music Asset Management/Commerce

The majority of domestic music piracy is not organized. Rather, it is a crime of opportunity and convenience. If the crime were made more difficult, the alternative of obtaining a copy through legitimate channels would be less onerous. Similarly, if the procedure for obtaining a copy through legitimate channels were simplified, the incentive for piracy would be reduced. Watermarking facilitates both—making the crime more difficult, and making legitimate music acquisition easier.

Consider, for example, the pricing of music in conventional record stores. A CD (compact disk) may cost \$15, but its sale may be driven by just one or two popular songs on the disk. To obtain these songs, the consumers must purchase the entire disk, with perhaps a dozen songs of no particular interest. This, in essence, is a tying arrangement that benefits the record labels while prejudicing the consumers. Given these circumstances, and a ready opportunity to make copies, it is not surprising that customers sometimes make illicit copies.

One classic technique of avoiding purchase of a complete collection of music, when only one or two songs is desired, is to record the music off the radio. While of dubious legality, this technique was popular in the era of combined cassette/radio players. However, the desired music was sometimes difficult to encounter in a radio broadcast, and the quality was less than superb.

The combined cassette/radio player has now evolved into a general purpose computer with wide-ranging functionality, and other sophisticated devices. Music can be acquired off the web, and can be recorded in various forms (e.g., in a personal MP3 player, stored on a hard disk, stored on a writable CD-ROM, played back and recorded on analog cassette, etc., etc.). The quality can be quite high, and the erratic broadcast time problems of radio broadcasts have been overcome by the web's on-demand delivery mechanisms. (Moreover, the music can be downloaded in faster-than-realtime, a further benefit over recording-off-the-air techniques.)

One hybrid between the new and old is a novel radio (e.g., for use in a car) that has a "capture" button on the front panel (or other form of user interface, e.g., a Capture icon on a GUI). If a user hears a song they want to record and keep, they press the Capture button while the song is playing. In response, the radio device decodes a watermark embedded in the music, and thereby knows the identity of the music. The radio then makes a wireless transmission identifying the user and the desired song. A local repeater network picks up the wireless signal and relays it (e.g., by wireless rebroadcast, by modem, or other communication medium) to a music clearinghouse. The clearinghouse charges the user a nominal fee (e.g. via a pre-arranged credit card), and queues the music for download to a predetermined location associated with the user.

In one embodiment, the predetermined location is the user's own computer. If a "live" IP address is known for the user's computer, the music can be transferred immediately. If the user's computer is only occasionally connected to the internet, the music can be stored at a web site (e.g. protected with a user-set password), and can be downloaded to the user's computer whenever it is convenient.

In other embodiments, the predetermined location is a personal music library maintained by the user. The library can take the form, e.g., of a hard-disk or semiconductor memory array in which the user customarily stores music. This storage device is adapted to provide music data to one or more playback units employed by the user (e.g. a personal MP3 player, a home stereo system, a car stereo system, etc.). In most installations, the library is physically located at the user's residence, but could be remotely sited, e.g. consolidated with the music libraries of many other users at a central location.

The personal music library can have its own internet connection. Or it can be equipped with wireless capabilities, permitting it to receive digital music from wireless broadcasts (e.g. from the clearinghouse). In either case, the library can provide music to the user's playback devices by short-range wireless broadcast.

By such arrangement, a user can conveniently compile an archive of favorite music—even while away from home.

Many variants of the foregoing are of course possible. The radio can be a portable unit (e.g. a boombox, a Walkman radio, etc.), rather than an automotive unit. The UI feature employed by the user to initiate capture a musical selection need not be a button (physical or on-screen). For example, in some embodiments it can be a voice-recognition system that responds to spoken commands, such as "capture" or "record." Or it can be a form of gesture interface.

Instead of decoding the watermark only in response to the user's "capture" command, the radio can decode watermarks from all received programs, and keep the most recent in a small FIFO memory. By such arrangement, the user need not issue the capture instruction while the song is playing, but can do so even after the song is finished.

In some embodiments, data corresponding to the watermark can be made available to the user in various forms. For example, it can be presented to the user on a LCD screen, identifying the artist and song currently playing. If a corresponding UI button is activated, the device can so-identify the last several selections. Moreover, the data need not be presented to the user in displayed form; it can be announced by known computer-speech technologies instead.

Embodiments in which the watermark does not convey ASCII text data, but instead conveys UUIDs, or coded abbreviations, the device must generally interpret this data before presenting it to the user. In an illustrative embodiment, the device is a pocket-sized FM radio and is equipped with a 1 megabyte semiconductor non-volatile RAM memory. The memory includes a data structure that serves as a look-up table, matching code numbers to artist names and song titles. When the user queries the device to learn the identity of a song, the memory is indexed in accordance with one or more fields from the decoded watermark, and the resulting textual data from the memory (e.g. song title and artist) is announced or displayed to the user.

In most applications, such memory will require frequent updating. The RF receiver provides a ready mechanism for providing such updated data. In one embodiment, the radio "awakens" briefly at otherwise idle moments and tunes to a predetermined frequency at which updated data for the memory is broadcast, either in a baseband broadcast channel, or in an ancillary (e.g. SCA) channel.

In variants of the foregoing, internet delivery of updated memory data can be substituted for wireless delivery. For example, the artist/song title memory in the personal player can be updated by placing the player in a "nest" every evening. The nest (which may be integrated with a battery charger for the appliance) can have an internet connection, and can exchange data with the personal device by infrared, inductive, or other proximity-coupling technologies, or through metal contacts. Each evening, the nest can receive an updated collection of artists/song titles, and can re-write the memory in the personal device accordingly. By such arrangement, the watermark data can always be properly interpreted for presentation to the user.

The "Capture" concepts noted above can be extended to other functions as well. One is akin to forwarding of email. If a consumer hears a song that another friend would enjoy, the listener can send a copy of the song to the friend. This instruction can be issued by pressing a "Send" button, or by invoking a similar function on a graphical (or voice- or gesture-responsive) user interface. In response, the appliance so-instructed can query the person as to the recipient. The person can designate the desired recipient(s) by typing in a name, or a portion thereof sufficient to uniquely identify the recipient. Or more typically, the person can speak the recipient's name. As is conventional with hands-free vehicle cell phones, a voice recognition unit can listen to the spoken instructions and identify the desired recipient. An "address book"-like feature has the requisite information for the recipient (e.g., the web site, IP address, or other data identifying the location to which music for that recipient should be stored or queued, the format in which the music should be delivered, etc.) stored therein. In response to such command, the appliance dispatches instructions to the clearinghouse, including an authorization to debit the sender's credit card for the music charge. Again, the clearinghouse attends to delivery of the music in a desired manner to the specified recipient.

Still further, a listener may query the appliance (by voice, GUI or physical button, textual, gesture, or other input) to

identify CDs on which the then-playing selection is recorded. Or the listener may query the appliance for the then-playing artist's concert schedule. Again, the appliance can contact a remote database, relay the query, and forward from the watermark payload identifying the artist and/or song title to which the query relates. The database locates the requested data, and relays same back to the appliance for presentation (via a display, by machine speech, or other output) to the user. If desired, the user can continue the dialog with a further instruction, e.g., to buy one of the CDs on which the then-playing song is included. Again, this instruction may be entered by voice, GUI, etc., and dispatched from the appliance to the clearinghouse, which can then complete the transaction in accordance with pre-stored information (e.g. credit card account number, mailing address, etc.). A confirming message is relayed to the appliance for presentation to the user.

While the foregoing transactions require a link to a remote site or database, other watermark-based consumer services can be provided without such a link. For example, a user can query the appliance as to the artist or song-title of the selection currently playing. The appliance can consult the embedded watermark data (and optionally consult a memory to determine the textual names associated with coded watermark data), and provide the requested information to the user (e.g., by a display, announcement, or other output).

The foregoing concepts (e.g. Capture, Send, etc.) can also be employed in connection with internet-rather than delivery of music. (The following discussion is illustrated with reference to the "Capture" function, but it will be recognized that the other earlier-discussed features can be similarly implemented.)

There are many commercial web sites that sell audio (in CD form or otherwise), and offer limited free music downloads, (or music clips) as an enticement to lure consumers. But there are also a great number of music web sites that have no commercial pretense. They are hosted by music lovers strictly for the enjoyment of other music lovers. When music is downloaded from such a web site, the end-user's computer can analyze the digital data to decode watermark data therefrom. Again, the user can be presented with a "Capture" button that initiates a commercial transaction, by which a complete copy of the then-downloaded audio is sent to a prearranged storage location, and the user's credit card is debited accordingly. This transaction can occur independently of the site from which the music is downloaded (e.g. through the clearinghouse referenced above).

While the "Capture" button can be presented on the web-site, this would generally not be in keeping with the non-commercial nature of such web sites. Instead, in an exemplary embodiment, the Capture feature is a software program resident at the user's computer. When this software program is invoked by the user, a socket channel is instantiated between the user's computer and the clearinghouse over the then-existing internet connection. The decoded watermark data and user ID is transmitted to the clearinghouse over this channel, without interrupting the user's other activity (e.g. downloading music from the non-commercial web site). In response, the clearinghouse transmits the music to the prearranged location and attends to billing.

In some embodiments, a watermark detector is included as part of the operating system, and constantly monitors all TCP/IP, or other internet, data received by the user's computer, for the presence of watermarks. In such case, when the Capture feature is invoked, the program examines a memory location in which the operating system stores the most-recently received watermark data. In another

embodiment, the computer does not monitor all internet traffic for embedded watermark data, but includes an API that can be called by the Capture program to decode a watermark from the data then being received. The API returns the decoded watermark data to the Capture program, which relays same to the clearinghouse, as above. In still another embodiment, the watermark decoder forms part of the Capture program, which both decodes the watermark and relays it to the clearinghouse when the Capture program is invoked by the user.

There are various techniques by which the Capture program can be selectively invoked. One is by a keyboard macro (e.g. by a combination of keyboard keys). Another is by a program icon that is always presented on the screen, and can be double-clicked to activate. (Again, confirmation processes may be called for, depending on the likelihood of inadvertent invocation.) Many other techniques are likewise possible.

In the just-contemplated scenario, the Capture operation is invoked while the user is downloading music from a non-commercial web site. This seems somewhat redundant, since the downloading—*itself*—is transferring music to the user's computer. However, the Capture operation provides added value.

In the case of streaming audio, the audio is not typically stored in a location in which it can be re-used by the consumer. It can be listened-to as delivered, but is then gone. Capturing the audio provides the user a copy that can be played repeatedly.

In the case of downloaded music files, the music may have been encoded to prevent its recording on other devices. Thus, while the user may download the music onto a desktop computer, copy-prevention mechanisms may prevent use of that file anywhere else, e.g. on a portable music appliance. Again, Capturing the audio provides the user a copy that can be transferred to another device. (The music file provided by the clearinghouse can have copy-prevention limits of its own—e.g., the file can be copied, but only once, or the file can be copied only onto devices owned by the user.)

(Confirmation of device ownership can be implemented in various ways. One is to identify to the clearinghouse all music devices owned by a user at the time the user registers with the clearinghouse (supplemented as necessary by later equipment acquisitions). Device IDs associated with a user can be stored in a database at the clearinghouse, and these can be encoded into the downloaded music as permitted devices to which the file can be copied, or on which it can be played.)

The commerce opportunity presented by non-commercial music web-sites is but one enabled by digital watermarks. There are many others.

To take one example, consider the media by which music and artists are presently promoted. In addition to radio airtime, these include music videos (a la MTV), fan magazines, web advertisements, graphical icons (e.g. the Grateful Dead dancing bears), posters, live events, movies, etc. Watermarked data can be used in all such media as a link in a commercial transaction.

A poster, for example, typically includes a photo of the artist, and may comprise cover-art from a CD. The photo/art can be digitally watermarked with various types of data, e.g., the artist's identity, the record label that distributes the artist's work, the music project being particularly promoted by the poster (e.g. a CD, or a concert tour), a fan web-site related to the artist, a web-site hosted by the record label for selling audio in CD or electronic form, a web-site from which free music by the artist can be downloaded, data identifying the poster itself, etc.

A user, equipped with a portable appliance that merges the functions of palmtop computer and digital camera, can snap an image of the poster. The processor can decode the watermarked data, and initiate any of various links based on the decoded data.

In an exemplary embodiment, after snapping the picture, the user invokes a software program on the device that exposes the various links gleaned from the snapped image data. Such a program can, for example, present the option of linking to the artist's fan web site, or downloading free streaming audio or music clips, or ordering the promoted CD, or requesting the above-noted clearinghouse to download a personal copy of selected song(s) by the artist to the user's personal music library, etc. (The device is presumed to have a wireless internet link. In devices not having this capability, the requested actions can be queued and automatically executed when a link to the internet is available.)

Still more complex transactions can be realized with the use of a remote database indexed by digital watermark fields decoded from the poster. For example, the poster may promote a concert tour. Fields of the digital watermark may identify the artist (by a code or full text), and a web site or IP address. The user appliance establishes a link to the specified site, and provides the artist identifier. In response, the site downloads the tour schedule for that artist, for display on the device. Additionally, the downloaded/displayed information can include a telephone number that can be used to order tickets or, more directly, can indicate the class of seats still available at each (or a selected) venue, and solicit a ticket order from the user over the device. The user can supply requested information (e.g. mailing address and charge card number) over the return channel link (wireless or wired, as the case may be), and the ticket(s) will be dispatched to the user. In the case of a wireless link all of this can occur while the user is standing in front of the movie poster.

Similar systems can be implemented based on watermark data encoded in any other promotional media. Consider music videos. Using known TV/computer appliances, watermark data added to such videos can readily be decoded, and used to establish links to audio download, CD-sales, fan club, concert ticket outlet web sites, etc., as above.

Even live events offer such watermark-based opportunities. The analog audio feed to public address or concert speakers can be watermarked (typically before amplification) to encode plural-bit digital data therein. A next generation personal music appliance (e.g. one with a wireless interface to the internet) can include analog record capability (e.g. a built-in microphone, analog-to-digital converter, MP3 encoder, coupled to the unit's semiconductor memory). A user who attends a live event may record an excerpt of the music. The watermark can then be decoded, and the extracted data used to access the links and commerce opportunities reviewed above.

Cinema movies offer both audio and visual opportunities for watermark-based commerce opportunities. Either medium can be encoded to convey information of the types reviewed above. A personal appliance with image- or audio-capture capabilities can capture an excerpt of the audio or imagery, decode the watermark data therefrom, and perform any of the linking, etc., functions reviewed above.

The consumer-interest watermarks reviewed above are only exemplary. Many others will be recognized as useful. For example, promotional clips presented before a feature film presentation can include watermark data that point (either by a literally encoded web address link, or by an ID code that indexes a literal link in a remote link database) to

reviewer critiques of the previewed movies. Watermark data in a featured film presentation can lead to web sites with information about the movie stars, the director, the producer, and can list other movies by each of these persons. Other watermark-conveyed web links can present opportunities to buy the movie on videotape, to purchase the movie soundtrack, to buy movie-related toys and games, etc.

More on Device Control

Much of the foregoing has focused on watermark encoding to provide enhanced customer experiences or opportunities. Naturally, watermarks data can alternatively, or additionally, serve the interests of the media owner.

To illustrate, consider watermarked music. The media owner would be best served if the watermark serves dual purposes: permissive and restrictive. Permissively, music appliances can be designed to play (or record) only music that includes an embedded watermark signaling that such activity is authorized. By this arrangement, if music is obtained from an unauthorized source and does not include the necessary watermark, the appliance will recognize that it does not have permission to use the music, so will refuse requests to play (or record).

As noted, music appliances can respond restrictively to the embedded watermark data to set limits on use of the music. Fields in the watermark can specify any or all of (or others in addition to) (a) the types of devices on which the music can be played; (b) the types of devices on which the music can be recorded; (c) the number of times the music can be played; (d) the number of times the music can be recorded, etc.

The device restrictions (a) and (b) can be of various types. In some embodiments, the restrictions can identify particular units (e.g. by serial number, registered owner, etc.) that are authorized to play/record the encoded music. Or the restrictions can identify particular classes of units (e.g., battery-powered portable players with music memories of less than 50 megabytes, disk-based dedicated music appliances, general purpose personal computers, etc.). Or the restrictions can identify particular performance quality criteria (e.g., two channel, 16-bit audio at 44.1 KHz sample rate, or lower quality).

The use restrictions (c) and (d) can likewise be of various types. Examples include "do not copy," "copy once only," "unrestricted copying permitted," "play once," "play N times" (where N is a parameter specified elsewhere in the watermark data, or by reference to a database indexed by a watermark data field), "unrestricted playing permitted," etc.

It is straight forward to design a music appliance to respond to usage limits of zero (e.g. "do not copy") and infinity (e.g. "unrestricted copying permitted," and "unrestricted playing permitted"). The device simply examines one or more bits in the watermark data, and permits (or refuses) an operation based on the value thereof.

Implementation of the other usage-control restrictions can proceed in various ways. Generally speaking, the stored music can be altered to give effect to the usage-control restrictions. For example, if the music is "record-once," then at the time of recording, the appliance can alter the music in a fashion indicating that it now has "do not record" status. This alteration can be done, e.g., by changing the watermark data embedded in the stored music (or adding watermark data), by changing other data stored in association with the music, etc. If the original signal is stored (as opposed, e.g., to a streaming signal, such as an internet or wireless transmission), it too should be so-altered.

Likewise with playback limitations. The number of playbacks remaining can, e.g., be encoded in an updated watermark in the music, be tracked in a separate counter, etc.

More particularly considering the "copy once" usage restriction, an illustrative embodiment provides two distinct watermark payload bits: a "copy once" bit and a "copy never" bit. When originally distributed (whether by internet, wireless, or otherwise), the "copy once" bit is set, and the "copy never" bit is un-set.

When music encoded in this fashion is provided to a compliant recording device, the device is authorized to make one copy. (A compliant device is one that recognizes encoded watermark data, and behaves as dictated by the watermark.) When this privilege is exercised, the recording device must alter the data to ensure that no further copying is possible. In the illustrated embodiment, this alteration is effected by the recording device adding a second watermark to both the music, with the "copy never" bit asserted. The second watermark must generally be encoded in an "orthogonal" domain, so that it will be detectable notwithstanding the continued presence of the original watermark. Compliant equipment must then check for both watermarks, and refuse to copy if either is found to have the "copy never" bit asserted.

One advantage to this arrangement is that if the watermark signal has undergone some form of corruption (e.g. scaling or resampling), the first watermark may have been weakened. In contrast, the second watermark will be native to the corrupted signal, and thus be more easily detected. (The corruption may also contribute to the orthogonality of one watermark relative to the other, since the two watermarks may not have precisely the same time base or other foundation.)

An alternative approach is not to encode the "copy never" bit in the original music, but leave this bit (in whatever manifestation) blank (i.e. neither "1" nor "0"). In transform-based watermark techniques, this can mean leaving transform coefficient(s) corresponding to the "copy never" bit un-changed. If the watermarking is effected in the temporal sample domain (or spatial domain, for image data), this can mean leaving certain samples/pixels unmodified. The recording device can then alter the transform coefficients and/or samples as necessary to assert the previously-unencoded "copy never" bit when the permitted recording is made.

In such a system, compliant recording devices check for the "copy never" bit in the sole watermark, and refuse to make a copy if it is asserted (ignoring the value of any "copy once" bit).

A third approach to "copy once" is to set both the "copy once" and "copy never" bits, but set the former bit very weakly (e.g. using lower gain and/or high frequency DCT coefficients that do not survive certain processing). The frail "copy once" bit is designed not to survive common corruptions, e.g., resampling scaling, digital to analog conversion, etc. To further assure that the "copy once" bit is lost, the recording device can deliberately add a weak noise signal that masks this bit (e.g. by adding a noise signal in the frequency band whose DCT coefficient conveys the "copy once" bit). In contrast, the "never copy" bit is unchanged and reliably detectable.

In such a system, compliant devices check for the "copy once" bit in the sole watermark, and refuse to make a copy if it is not detected as set.

These three examples are but illustrations of many possible techniques for changing the rights associated with a work. Many other techniques are known. See, e.g., the proposals for watermark-based copy control systems for digital video at the Copy Protection Technical Working Group, <http://www.dvcc.com/dbsg/>, from which certain of

the foregoing examples are drawn. See also Bloom et al., "Copy Protection for DVD Video," IEEE Proceedings, Special Issue on Identification and Protection of Multimedia Information, June, 1999.

One feature that is desirable in many detector embodiments is scalability. This refers to the ability of a detector to scale its computational demands to match the computational resources available to it. If a detector is running on a high performance Pentium III workstation, it should be "doing more" than if the same detector is running on a slow microcontroller. One way scalability can be achieved is by processing more or less chunks of input data (e.g. temporal excerpts of music, or blocks/macroblocs of pixels in a frame of video data) to decode watermarks. For example, an input audio stream might be broken into chunks of one second each. A fast processor may complete decoding of each chunk in less than a second, permitting it successively to process each chunk in the data stream. In contrast, a slow processor may require two and a half seconds to decode the watermark from a chunk. While it is processing a first chunk, the second and third pass by un-decoded. The processor next grabs and processes the fourth chunk, permitting the fifth and sixth to pass by un-decoded.

The detector running on the fast processor is clearly more difficult to "fool," and yields a decoded watermark of higher confidence. But both systems decode the watermark, and both operate in "real time."

The skipping of input data in the temporal (e.g. music or video) or spatial (e.g. image or video) domain is but one example of how scalability can be achieved. Many other approaches are known to those skilled in the art. Some of these alternatives rely on spending more or less time in the data analysis phases of watermark decoding, such as cross-correlation operations.

Reference has been made to watermarked UIDs as referring to a database from which larger data strings (e.g. web addresses, musician names, etc.) can be retrieved. In some embodiments, the data record referenced by a UID can, in turn, point to several other database records. By such arrangements, it is often possible to reduce the payload of the watermark, since a single UID reference can lead to several different data records.

Production Tools

In the prior art, the watermark embedded in a source material is typically consistent and static through a work—unchanging from beginning to end. But as will be recognized from the foregoing, there are many applications that are better served by changing the watermark data dynamically during the course of the work. According to another aspect of the invention, a production tool is provided that facilitates the selection and embedding of dynamically-changing watermark data. One such embodiment is a software program having a user interface that graphically displays the different watermark fields that are being embedded in a work, and presents a library of data (textually or by icons) that can be inserted into each field, and/or permits the user to type in data to be encoded. Another control on the UI controls the advance and rewind of the media, permitting the user to determine the location at which different watermark data begins and ends. Graphical paradigms known from video- and audio-editing tools can be used to indicate the starting and ending frames/samples for each different watermark payload.

Such a tool can be of the standalone variety, or can be integrated into the desktop audio- and video-production and editing tools offered by vendors such as Avid, Adobe, Jaleo,

Pinnacle Systems, SoundForge, Sonic Foundry, Xing Technology, Prosonia, and Sonic Desktop Software.

Payment-Based Systems

Another aspect of the present invention is the use of anonymous payment tokens that can be used to obtain content on the web. In one embodiment, a token comprises a 128-bit pseudo-random number, to which additional bits identifying an issuing bank (or other issuing institution) are appended. (The additional bits can be the IP address of a web server of the bank, a routing number identifying the bank for electronic wire transfers, or other identifier.) The 128-bit numbers are randomly generated by the bank—commonly as needed—and each represents a fixed increment of money, e.g. ten cents.

A consumer wishing to have a store of currency for such commerce pays the bank, e.g., \$10 in exchange for 100 tokens. These tokens are transferred electronically to disk or other storage in the consumer's computer in response, e.g., to a credit card authorization, or may be provided by diskette or other storage medium over the counter at a bank branch (in which case the consumer thereafter copies the numbers into storage of his or her computer). (Outlets other than banks can of course be employed for distributing such numbers, much in the manner that convenience and many grocery stores commonly issue money orders.)

Imagine that the consumer wishes to view the final quarter of a Trailblazer basketball game that aired on television a week ago. (The consumer may have either missed the game, or may have seen it but wants to see the last quarter again.) The user directs a web browser to a web site maintained for such purpose and performs a search to identify the desired program. (Typically, the web site is maintained by the proprietor that holds the copyright in the material, but this need not be the case. Some material may be available at several web sites, e.g., maintained by ABC Sports, the National Basketball Association, and Sports Illustrated.) The search can use any of various known search engines, e.g., Infoseek, Verity, etc., and can permit searching by title terms, keywords, date of airing, copyright owner, etc. By typing in, e.g., the keyword "Trailblazers" and the date "Apr. 26, 1999," the consumer is presented a listing of videos available for download. One, hopefully, is the requested game. With each listing is an indication of an associated nominal charge (e.g. 80 cents).

On clicking on a hypertext link associated with the desired basketball game, the viewer is presented a further screen with one or more options. The first of the listed options is the entire game, with commercials. The charge is the nominal charge presented on the earlier screen (i.e. 80 cents). Other options may include the first, second, third, and fourth quarters of the game individually, each of which—save the last, costs 20 cents. The last may be charged at a premium rate, e.g., 30 cents. Clicking on the desired video option yields a further screen through which payment is effected.

To pay for the requested video, the consumer instructs his or her computer to transfer three of the earlier-purchased tokens over the web to the video provider. Various user interface metaphors can be employed to facilitate this transfer, e.g., permitting the user to type the amount of money to be transferred in a dialog box presented on-screen, or dropping/dragging icons representing tokens from an on-screen "wallet" to an on-screen "ticket booth" (or over an icon or thumbnail representing the desired content), clicking on an "increment" counter displayed adjacent the listing of the content, etc. Once the consumer has authorized a transfer of sufficient tokens, the consumer's computer sends to the

web site (or to such other web address as HTML encoding in the viewed web page may indicate) the tokens. This transmission simply takes the form of the three 128-bit numbers (the '+' indicating the bank identifier)—in whatever packet or other format may be used by the internet link. Once dispatched in this manner, the tokens are deleted from the user's computer, or simply marked as spent. (Of course, in other embodiments, a record of the expenditure may be stored in the consumer's computer, e.g., with the token contents and a record of the audio or video purchase to which they were applied.)

Since the amount of money is nominal, no encryption is provided in this embodiment, although encryption can naturally be provided in other embodiments (e.g., either in sending the tokens from the user to the web site, or earlier, in sending the tokens to the user). As will be seen, provided that the media provider immediately sends the tokens to the bank in real time, encryption is a nice feature but not mandatory.

On receipt of the token data, the web site immediately routes the token data to the identified bank, together with an identifier of the media provider or account to which the funds represented thereby are to be credited. The bank checks whether the 128-bit numbers have been issued by that bank, and whether they have already been spent. If the numbers are valid, the bank updates its disk-based records to indicate that the three tokens have been spent and that the bank now owes the media supplier 30 cents, which it may either pay immediately (e.g., by crediting to an account identified by the media provider) or as one lump sum at the end of the month. The bank then sends a message to the web site confirming that the tokens were valid and credited to the requested account. (Optionally, a message can be sent to the purchaser of the tokens (if known), reporting that the tokens have been redeemed.)

In response, the web site begins delivery of the requested video to the consumer. In the illustrated embodiment, the video is watermarked prior to delivery, but otherwise sent in unencrypted fashion, typically in streaming format, but optionally in file format. (Encryption can be used in other embodiments.) The watermarking in the illustrated embodiment is accomplished on-the-fly and can include various data, including the date of downloading, the download site, the destination IP address, the identity of the purchaser (if known), etc.

The large size of the video and the small charge assessed therefore provide disincentives for the consumer making illicit copies. (Especially as to archival material whose value decays with time, there is not much after-market demand that could be served by illicit copies, making third party compilation of such material for re-distribution financially unattractive. First run video, and material that keeps a high value over time, would not be as well suited for such distribution, and could better employ technology disclosed elsewhere herein.)

In some embodiments, the integrity of the received video is checked on receipt. This feature is described below in the section entitled Watermark-Based Receipts.

In the illustrative system, nothing in the tokens indicates the identity of the purchaser. The web site knows the IP address of the site to which video was delivered, but need not otherwise know the identity of the purchaser. The bank would probably maintain a record of who purchased the tokens, but need not. In any event, such tokens could thereafter be exchanged among consumers, resulting in anonymity from the bank, if desired.

As described above, the video excerpts from which the consumer can select include commercials. At some sites,

video may be provided from which the commercials have been excised, or which is delivered in a manner that skips past the commercials without transmitting same to the consumer. Such video will naturally command a premium price. In some embodiments, the difference in price is electronically credited as compensation to accounts maintained for (or by) the advertisers, whose advertisements are not being viewed by such consumers. (The identification of advertisers to be credited is desirably permanently encoded in the video, either throughout the video (if the video has had the commercials removed therefrom), or by data in the commercials themselves (which commercials are skipped for transmission to the consumer, but can still be decoded at the video head-end. Such encoding can be by in-band watermarking or otherwise.)

While the foregoing discussion particularly considered video as the desired content, the same principles are equally applicable in connection with audio, still imagery, and other content.

The token-based payment method is but one of many that can be employed; the literature relating to on-line payment mechanisms is extensive, and all such systems can generally be here-employed.

Tracking 128-bit tokens can be a logistical problem for the bank. One approach is to have a memory with 10^{28} locations, and at each location store a two-bit value (e.g., 00=never issued; 01=issued but not spent; 10=issued and spent; 11=reserved). More complete data could alternatively be stored, but such a memory would be impractically large.

One alternative approach is to hash each 128-bit number, when issued, to a much smaller key value (e.g., 20 bits). A memory with 10^{20} locations can be indexed by this key. Each such location can include four data: an issued 128-bit token number that hashes to that value, first and second date fields indicating the date/time on which that token was issued and redeemed, respectively, and a link specifying the address of a next memory location. That next memory location (outside of the original 10^{20} locations) can include four more data, this time for a second issued-128-bit token number that hashed to the original key value, two date fields, and again with a link to a subsequent storage location, etc.

When a 128-bit random number is generated, the original memory location indexed by the hash code of that number is checked for an earlier number of the identical value (to avoid issuance of duplicate tokens). Each successive location in the linked chain of memory locations is checked for the same 128-bit number. When the end of the linked chain is reached, the bank knows that the 128-bit random number has not previously been issued, and writes that number in the last-addressed location, together with the date of issuance, and a link to a next storage location.

When a 128-bit token is received, the same linked-list processing occurs to identify a first location, and to thereafter step through each subsequent location until a match is found between the token number and the number stored in one of the linked memory locations. When found, that number is marked as redeemed by writing a redemption date/time in the corresponding field. If the search reaches the end of the linked chain without finding a match between the stored numbers and the token number, the token is treated as invalid (i.e. not issued by that bank).

Other manners of tracking the large number of possible token numbers can of course be used; the foregoing is just exemplary. Or the tokens needn't be tracked at all. Such an arrangement is highly practical if the token has sufficient bias. With the illustrated 128 bits, for example, the chance of two identical tokens being issued is infinitesimally small, so

checking for duplicate issuance can be omitted if desired. In such case, the bank can simply maintain an ordered list of the token numbers still outstanding and valid. As new tokens are dispensed, their token numbers are added to the list. As tokens are redeemed, their numbers are deleted from the list. Known list processing techniques can be employed to speed such search, update, and delete actions.

Watermark-Based Receipts

Pay-for-content applications commonly assume that if content is transmitted from a server (or head-end, etc.), it is necessarily received. Sometimes this assumption is wrong. Network outages and interruptions and internet traffic load can diminish (e.g., dropped video frames), or even negate (e.g., failed delivery), expected consumer enjoyment of content. In such cases, the consumer is left to haggle with the content provider in order to obtain an adjustment, or refund, of assessed charges.

Watermarks provide a mechanism for confirming receipt of content. If a watermark is detected continuously during a download or other delivery event, a software program (or hardware device) can issue an electronic receipt attesting that the content was properly delivered. This receipt can be stored, and/or sent to the content distributor to confirm delivery.

In one embodiment, a content receiving device (e.g., computer, television or set-top box, audio appliance, etc.) periodically decodes a watermark from the received content to confirm its continued reception. For example, every five seconds a watermark detector can decode the watermark and make a record of the decoded data (or simply record the fact of continued detection of the same watermark). When a changed watermark is detected (i.e., reception of a different content object begins), the duration of the previously-received content is logged, and a receipt is issued.

In a related embodiment, the last portion (e.g., 5 seconds, frame, etc.) of the content bears a different "end of content" watermark that triggers issuance of a receipt. Such a watermark can indicate the length of the content, to serve as a cross-check against the periodic watermark polling. (E.g., if periodic sampling at 2 second intervals yields 545 samples corresponding to the same content, and if the "end of content" watermark indicates that the content was 1090 seconds long, then receipt of the entire content can be confirmed.)

In another embodiment, the watermark can change during the course of the content by including, e.g., a datum that increments every frame or other increment of time (e.g., frame number, time stamp, etc.). A watermark detector can monitor the continued incrementing of this datum throughout the content to confirm that no part was garbled (which would destroy the watermark) or was otherwise missing. Again, at the end of delivery, the receiving system can issue a confirmation that XXX frames/seconds/etc. of the identified content were received.

One application of such technology is to bill for content based on receipt, rather than transmission. Moreover, billings can be adjusted based on percentage of content-value received. If delivery is interrupted mid-way through (e.g., by the consumer disabling the content-receiving device), the nominal billing for the content can be halved. Some prolonged content, e.g., televised/web-broadcast university classes, cannot be "consumed" in one session, and are thus particularly well suited for such pay-as-you-consume billing.

Another application of such technology is in advertising verification. Presently, ads are tracked by transmission or, less frequently, by detection of an embedded code on receipt

(cf., Nielsen Media Research's U.S. Pat. Nos. 5,850,249 and 5,737,025). However, such reception-detectors—once triggered—generally do not further note the length of time that the advertising was received, so the same data is produced regardless of whether only five or fifty seconds of a commercial is presented. Watermark monitoring as contemplated herein allows the duration of the advertising impression to be precisely tracked.

In one application of this technology, recipients of advertising are provided incentives for viewing advertising in its entirety. For example, a content-receiving device can include a watermark detector that issues a receipt for each advertisement that is heard/viewed in its entirety. These receipts can be redeemed, e.g., for content tokens as described elsewhere herein, for monetary value, etc. In some embodiments, receipts are generic and can all be applied to a desired premium, regardless of the advertisements through which they were earned. In other embodiments, the receipts are associated with the particular advertisers (or class of advertisers). Thus, a TV viewer who accumulates 50 receipts from advertising originating from Procter & Gamble may be able to redeem same for a coupon good for \$2.50 off any Procter & Gamble product, or receipts from Delta Airlines may be redeemed for Delta frequency flyer miles (e.g., at a rate of one mile per minute of advertising). Such incentives are particularly useful in new forms of media that give the consumer enhanced opportunities to fast-forward or otherwise skip advertising.

(Although the foregoing "receipt" concept has been described in conjunction with watermark data (and use of watermark technology is believed to be inherently advantageous in this application), the same principles can likewise be implemented with ancillary data conveyed by other means.)

Master Global Address

As suggested above, it is desirable that each piece of content have a web address (the "Master Global Address" (MGA), or "Master IP Address") associated with it. Such address is typically conveyed with the content, e.g., by an IP address watermark therein.

Consider a consumer who downloads a streaming video having an English language soundtrack. The viewer may not speak English, or may otherwise prefer to listen to the soundtrack in another language. The user can decode the watermark data embedded in the video and initiate a link to the associated web address. There the user is presented with a list of soundtracks for that content object in other languages. The viewer can click on the desired language and receive same via a second simultaneous transmission (e.g., a second socket channel). The consumer's audio/video appliance can substitute the desired audio track for the default English track.

If the streaming video and the alternative soundtrack are hosted on the same server, synchronization is straightforward. The process governing transmission of the alternative soundtrack identifies the process that is streaming video to the same IP address. Based on SMPTE, or other time frame data, the former process syncs to the latter. (If the two data streams don't originate through the same server, time/frame data can be relayed as necessary to the alternative soundtrack server to effect synchronization.)

Another application of the Master Global Address is to serve as a point to which monitoring stations can report the presence, or passage, of content. Consider, for example, a copyright-aware node through which content signals pass, e.g., a computer node on a network, a satellite transponder, etc. Whenever the node detects passage of a media object

(e.g., by reference to a file extension, such as MP3, JPG, AVI, etc.), it sends a "ping" over the internet to the address encoded in the object, simply reporting passage of the object. Similar monitoring facilities can be provided in end user computers, e.g., reporting FileOpen, FileSave, Printing, or other use of content bearing MGA data.

This system can be expanded to include "ping" and "pong" phases of operation. When a software application (or a user appliance, such as a video or audio playback device) encounters a media object (e.g., at time of file open, at time of playback, etc.), it pings the MGA site to report the encounter. The MGA site "pongs" back, responding with instructions appropriate to the encounter. For example, if the object requires payment of a fee before full functionality or access is to be granted, the MGA site can respond to the application with instructions that the object be used (e.g., played back) only in some crippled state preventing the user's full enjoyment (e.g., impaired resolution, or impaired sound quality, or excerpts only, etc.). The MGA site can also inform the user application of the terms (e.g., payment) by which full functionality can be obtained. The application can graphically or audibly present such information to the user, who can authorize a payment, if desired, so that the content can be enjoyed in a less- (or un-) crippled state. On receipt of the payment authorization, the MGA site can inform the user application that enhanced access/usage rights have been purchased, and that the application may proceed accordingly.

Yet another application of the MGA is to present the user of a content object a menu of options that is customized to that object.

In current graphical operating systems, when a user clicks on an icon (e.g., with the right mouse button), a menu is presented detailing actions that can be undertaken in connection with the icon, or the file represented thereby. Such options are pre-programmed (i.e., static), and are typically determined by the operating system based solely on the file extension.

In accordance with this aspect of the present invention, clicking on an icon representing a media object initiates an internet link to the MGA site associated with the object. The MGA site responds with data that is used to customize the menu of options presented to the user in connection with that particular object.

Consider an icon representing a JPG image file. Right-clicking on the icon may yield a menu that gives the user various options presented by the operating system (e.g., delete, compress, rename), and additional options customized in accordance with data from the object's MGA site. These customized options may include, e.g.,

- (a) open in 100x150 pixel format for free;
- (b) open in 480x640 pixel format for ten cents;
- (c) open in 960x1280 pixel format for twenty cents;
- (d) purchase rights to use this image in a newsletter having a circulation of under 1000 for \$1.25;
- (e) display a complete listing of license options.

Clicking on options (b) or (c) initiates a commerce application through which funds are electronically transferred to the MGA site (by the above-described tokens or otherwise). In response, the MGA site responds (e.g., with TCP/IP or HTML instructions) authorizing an application on the user's computer to open the file in the requested manner. (The default application for JPG applications can then automatically be launched, or the computer may first query the user whether another application should be used instead.)

Clicking on option (d) proceeds as above, and permits full use of the image on the computer. Moreover, the MGA site sends a digital certificate to the user's computer memorializing the usage rights purchased by the consumer.

In this particular arrangement, no access control is placed on the content, e.g., by encryption, secure container technology, or the like. The nominal fees, and the ease of licensing, make it simple for the user to "do the right thing" and avoid copyright liability. In other embodiments, of course, known access control techniques can be used to limit use of the object until the requisite payment has been made.

Naturally, records of all such transactions are also logged at the MGA site.

Clicking on option (e) opens a browser window on the user's computer to a web site that presents a complete listing of license options available for that image. (The address of this web site is included in customization data relayed to the user device from the MGA site, but not explicitly shown to the user on the menu.) Through such web site, the user can select desired rights, effect payment, and receive the necessary authorization for software applications on the user's computer (or other media appliance) to open and/or process the content.

The object on which the user "clicks" needn't be an icon. It can be an image or other graphical representation. (And a "click" isn't necessary; a voice command or other signal may be used to the same effect with an audio clip or selection.)

Consider the popular merchandising of books and CDs over the internet. A JPG or other image file depicting the cover of a book, or the artwork of a CD cover, can be treated as a media object, and can include a watermarked MGA pointer. Right-clicking on such an image of a book cover could, through the MGA site, present to the user a menu of options that includes—in addition to those normally presented in conjunction with a JPG file—the following:

- (a) "See the review of this book published in the New York Times on Apr. 19, 1999"
- (b) "See the list of reviews of this book at Amazon.com"
- (c) "Enter your own review of this book, for posting on Amazon.com"
- (d) "See today's sales rank of this book at Amazon.com"
- (e) "Purchase this book from Amazon.com for \$16.95"
- (f) "Purchase this book from Barnesandnoble.com for \$19.95 and receive a \$5.00 credit towards your next purchase"
- (g) "Link to the web site that tells about the release of this title as a motion picture (presently scheduled to open on Oct. 10, 1999)"
- (h) "Link to the Yahoo listing of web sites relating to this book"
- (i) "Search Lycos for listings relating to this book."

If the user selects one of the purchase options from the menu, a pre-stored e-commerce profile—containing the user name, credit card number, billing address, ship-to address, etc., possibly in the form of an encrypted object—could be sent to the MGA site (or to the bookseller) to effect the purchase, or such selection could initiate display of additional screens or sub-menus through which the user would manually enter or select such information for transmission.

Others of the selections cause a new browser window to open on the user's computer, opening to a URL specified in data relayed from the MGA site but not displayed to the user in the menu. Appropriate HTML instructions can be generated to effect a particular query or other operation at the specified URL.

In some embodiments, the customized menu presents only a single choice in addition to those normally provided by the operating system, e.g., "Link to home." Clicking on this option opens a browser window to a home page at the MGA for that object. On that page, the user is presented with all of the foregoing options, and more (possibly including advertising graphics or multi-media). Such objects can serve as powerful marketing agents. Returning to the example discussed above, a JPG image file of a book cover may have, as its MGA, a web page hosted by a particular bookseller, providing purchase options and other information for that book. Marketing of books (or CDs, or cars, or consumer appliances, or virtually anything else) can be effected by disseminating such vendor-issued JPGs as widely as possible. Some book cover JPGs may be distributed by Amazon.com, others by Barnes&Noble.com, others by Borders.com—each pointing back to a different MGA through which purchase transactions for that book may be performed.

Returning to the MGA-customized menus, these needn't be limited to menus resulting from clicking on an icon or image (or signaling during an audio excerpt). Drop-down menus in application programs can likewise be populated with customized options, in accordance with customization data obtained from the MGA site for the object presently being accessed or used. Most graphical operating systems and application programs have well developed toolsets permitting such menu customization. Again, other data relayed from the MGA site is not shown to the user, but is employed by the computer (e.g., a browser program) to carry out menu options selected by the user.

Again the foregoing techniques are equally applicable for still images, audio, video, and other forms of content, and can readily be adapted for use both with general purpose computers, software applications, and specialized media appliances.

While, for expository convenience, the foregoing discussion contemplated embedding a literal URL address in the object as the MGA, more typically this is not the case. Instead, the MGA more commonly comprises identification data for the object (e.g., a 128-bit random ID), together with the URL for a name server computer that serves many (perhaps millions) of such objects (an example of the latter is the Digimarc MarcCentre server).

To obtain the desired data as detailed above, the user's computer (sometimes termed a client computer) links to the name server computer and provides the ID of the object being processed. The name server computer uses this ID to query a database, and obtains from the database the current IP address to which such queries should be routed. The name server computer can relay the request from the client computer to the correct destination address, or can return the correct destination address to the client computer, which can initiate such a link itself. By such arrangement, the IP address ultimately associated with an object can be easily changed as needed, simply by changing the corresponding record in the name server database, without rendering obsolete legacy objects having out-of-date addresses encoded therein.

In some embodiments, the URL of the name server needn't be included in the watermark. In the absence of a specified URL, the client computer may direct such links to a default name server address instead (stored locally or remotely). If that server doesn't recognize the object ID, it can return an error code, or pass the query on to other name servers. Those servers, in turn, can pass the query along to still other name servers if they don't recognize the object ID.

In this fashion, an exponentially-large number of name servers might be quickly polled for information relating to the identified object. Alternatively, rather than encoding the complete IP address of the name server in an object watermark, the first N (e.g., 16) bits of the object ID might be used as a short-hand for one of 65,536 predetermined name server addresses, in accordance with data stored locally (e.g., on RAM or disk in the user's computer) or remotely (e.g., at a default name server IP address).

While the basic concept idea behind embedding MGA data within an object is to point to a repository of data about the object, a pointer the other way may be achieved as well.

As noted, the "ping" application of MGA data permits an MGA site to be informed of sites through which its object passes. More generally, the MGA site can log the originating address of each query it receives. Each such address can be presumed to have (or have had) a copy of the corresponding object. Media owners can thereby track the dissemination of copies of their media objects—at least insofar as use of such objects entails communicating with the associated MGA site.

Such tracking offers a great number of opportunities, some in the area of commerce. The MGA site corresponding to the cover art of a Garth Brooks CD, for example, can provide a listing of IP addresses of persons interested in that CD. Email or promotional data objects (e.g., audio clips) can be sent to that list of addresses when a subsequent Garth Brooks CD is released.

Such tracking also opens up a new dimension of internet searching. Presently, internet search engines use a brute force approach, visiting millions of pages across the web in order to identify, for example, a dozen instances of a given photograph file. MGAs offer a shortcut to such brute force approaches. With the present technology, a search engine can find a single instance of a photograph file and, by detection of the MGA data watermark therein, link to the corresponding MGA site. From the MGA site, the search engine can obtain a listing (if such queries are authorized) of some or all of the other sites known by the MGA site to have copies of that photograph file. (Providing such data to search engines is a commerce opportunity for such MGA sites, which may permit such access to its listing of sites only in exchange for a fee. Or the MGA site may arrange to collect a tribute payment from the search engine proprietor each time the engine responds to a user query using data collected from the MGA site.)

Many of the addresses logged by the MGA may not be publicly-accessible data stores. The search engine can check each listed address to ensure that the desired object is present and accessible before adding the address to its database.

Covert Tracing

Co-pending application Ser. No. 09/185,380 describes anti-counterfeiting technology that looks for the presence of digital data corresponding to bank note imagery in a computer system, and makes a covert record of any attempt to process such data (e.g., Scan, FileOpen, FileSave, Print, Edit, etc.). Such records are hidden from the user of the system (using, e.g., various data encryption and obscuring techniques), but authorized law enforcement officials are provided tools by which these records can be recovered. The forensic data thereby obtained may prove useful in prosecuting counterfeiters. (Knowledge that a computer may be covertly storing evidence of attempted counterfeiting actions may prove as, or more, valuable in deterring counterfeiting than the covert records themselves.)

The same techniques can be employed to deter unauthorized processing of audio, image, video, or content by media

pirates. In one embodiment, a computer's operating system (including peripheral device drivers) monitors various data within the system (e.g., data sent to writable storage media, or sent via a serial port or network connection, etc.) for data bearing a do-not-copy watermark. The presence of such data being sent, e.g., to a writable disk or to a remote computer, indicates that the do-not-copy instruction has been circumvented. In such case, the operating system writes one or more covert records memorializing the activity, for possible use in criminal prosecution if the computer is lawfully seized.

The example just-provided is but one of many monitoring and response techniques that may be employed to deter circumvention of copy-protection or other access control systems. Generally speaking, if content data is found where it shouldn't be, or is found used as it shouldn't be used, a corresponding record should be made. (Other intervention actions can be triggered as well; covert tracing is desirably just one of several parallel responses to suspected hacking.)

Meta-Data Accessed Using Watermarks

Meta-data, in formats known as XML, SGML, and HTML, is widely used to communicate information about digital objects (e.g., author, keywords, price, rights, caption, etc.). More generally, meta-data can be thought of as any data construct which associates the name of a property (e.g., "author," with the value of the property (e.g., "Mark Twain"). Such data commonly appears in a tag format, such as the following:

```
<META NAME="author" CONTENT="Mark Twain">
```

Meta-data is commonly exchanged between server and client computers in conjunction with the digital objects to which they relate (e.g., the text of a Mark Twain book).

As detailed herein, an important application of watermarking is likewise to convey information about media—in this case embedded within the media content itself (e.g., providing unique identification, establishing some basic behaviors such as do not copy, and providing links to extended functionality).

For meta-data to be useful, it must be linked to associated content, whether in the context of a browser, application program, operating system, asset management system, search engine, etc. However, as detailed below, the content and the associated meta-tags needn't always be conveyed together.

Consider an application program or other client process that receives a watermarked media object. The watermark includes an MGA for that object (which, as noted above, may not specify an ultimate IP address). Stored at the MGA site is meta-data corresponding to the object. By linking to the MGA site identified by the object's watermark, the client computer can obtain the meta-data corresponding to the object. This data can be stored at the client computer and used just as any other meta-data, e.g., to define the local functions that should be available for use with that object (e.g., buy, search, etc.).

A particular example is an on-line catalog of stock photography. Each photograph is watermarked with MGA data. To identify the photographer, copyright date, price, telephone number, subject, etc., an application program can link to the MGA site for that photograph, and obtain the corresponding meta-data. This data can then be displayed or used as needed. Data objects of disparate formats thus can readily be handled within a single, simple application program, since the program needn't concern itself with the varying formats for the associated meta-data (assuming the name servers provide this data in standardized format). Substantial flexibility in programming and object formatting is thereby achieved.

Returning to the internet search engine example described above, MGAs may become recognized as repositories rich in meta-data for media objects. Specialized search engines may focus their data collection around such sites, and be able to quickly identify the MGA sites corresponding to various boolean combinations of meta-tag parameters.

Asset Management/Containers

Much has been written on the topic of asset rights management. Sample patent documents include U.S. Pat. Nos. 5,892,900, 5,715,403, 5,638,443, 5,634,012, 5,629,980 and laid-open European application EP 862,318. Much of the technical work is memorialized in journal articles, which can be identified by searching for relevant company names and trademarks such as IBM's Cryptolope system, Portland Software's ZipLock system, the Rights Exchange service by Softbank Net Solutions, and the DigiBox system from InterTrust Technologies.

An exemplary asset management system makes content available (e.g. from a web server, or on a new computer's hard disk) in encrypted form. Associated with the encrypted content is data identifying the content (e.g. a preview) and data specifying various rights associated with the content. If a user wants to make fuller use of the content, the user provides a charge authorization (e.g. a credit card) to the distributor, who then provides a decryption key, allowing access to the content. (Such systems are often realized using object-based technology. In such systems, the content is commonly said to be distributed in a "secure container.")

Desirably, the content should be marked personalized/serialized so that any illicit use of the content (after decryption) can be tracked. This marking can be performed with watermarking, which assures that the mark travels with the content wherever—and in whatever form—it may go. The watermarking can be effected by the distributor—prior to dissemination of the encrypted object—such as by encoding a UID that is associated in a database with that particular container. When access rights are granted to that container, the database record can be updated to reflect the purchaser, the purchase date, the rights granted, etc. An alternative is to include a watermark encoder in the software tool used to access (e.g. decrypt) the content. Such an encoder can embed watermark data in the content as it is released from the secure container, before it is provided to the user. The embedded data can include a UID. This UID can be assigned by the distributor prior to disseminating the container. Alternatively, the UID can be a data string not known or created until access rights have been granted. In addition to the UID, the watermark can include other data not known to the distributor, e.g. information specific to the time(s) and manner(s) of accessing the content.

As noted earlier, access rights systems can be realized with watermarks without containers etc. For example, in a trusting world, copyrighted works can be freely available on the web. If a user wishes to make lawful use of the work, the user can decode its watermark to determine the work's terms and conditions of use. This may entail linking to a web site specified by the embedded watermark (directly, or through an intermediate database), which specifies the desired information. The user can then arrange the necessary payment, and use the item knowing that the necessary rights have been secured.

Remote Reconfiguration of Watermark Detectors

In some cases, it is desirable to reconfigure watermark detectors remotely. Such functionality is desirable, for example, if a watermark system is hacked or otherwise compromised.

In accordance with this aspect of the present invention, some aspect of a watermark detector's operation is changed

in response to a command. The change can take various forms. In watermark systems employing pseudo-random key data (e.g., spread spectrum spreading signals), the pseudo-random signal used for detection can be changed. In systems using DFT processing, the mapping between message bits and DFT coefficients can be changed. In still other systems, the decoding can proceed as before, but the significance of one or more bits can be changed (e.g., bits that were normally interpreted as defining field A can be interpreted as defining field B, and vice versa). In yet other systems, the decoding can proceed as before, but the response of a device to a given watermark signal can be changed. In still other systems, a set of software instructions can be re-written or re-ordered to effect a change in detector operation.

The command can be conveyed in various ways. In one embodiment, it can be a trigger bit in the watermark payload. Normally the bit has a value of "0." If the bit has a value of "1," the detector system responds by changing its operation. A trigger pattern can also be established, so that detection of a certain combination of bits in the watermark payload serves to trigger the change. Reserved states of certain data fields are examples of patterns that might be employed.

The command can also be conveyed through another channel different than the watermark channel (e.g., an SCA channel of an FM broadcast, or the sub-titling data channel of video broadcasts, or header data within an MPEG data stream, etc.).

The change can proceed in accordance with a pre-programmed rule (e.g., codes progressing successively through a numerically or algorithmically-determined progression), or the change can proceed in accordance with data specified elsewhere in the payload of the watermark bearing the trigger bit (e.g., instead of being interpreted in normal fashion, the non-trigger bits of the detected watermark can define a new pseudo-random key data. Or the change can proceed in accordance with data conveyed in successively-presented watermark payloads, as might be done in video encoding where each frame of video can convey further watermark information. (This latter arrangement is one offering a high-bandwidth re-programming channel through which, e.g., extensive firmware instructions might be transferred to the detector to replace instructions earlier stored.)

By such arrangements, greatly increased detector versatility and functionality can be achieved.

Conclusion

Many diverse embodiments are reviewed above—each with a unique set of features. (Still others are disclosed in the assignee's patents incorporated by reference.) This specification should be construed as explicitly teaching that features illustrated in one such embodiment can generally be used in other embodiments as well. Thus, for example, a date field was not particularly discussed in connection with payload data for video watermarking. Nor were "play once" watermarks so-considered. The inclusion of a calibration signal with (or as part of) the watermark is shown in embodiments of the issued patents, but is not belabored in the above-described embodiments. Likewise with "simple universal codes." The pre-stored commerce profile described in one of the foregoing embodiments is equally applicable to other embodiments as well. Likewise, the presentation of advertising was discussed in connection with one embodiment but not others, although it, too, is generally applicable. All of these concepts are familiar at Digimarc and are regarded as generally applicable throughout the work expressed in Digimarc's patent disclosures. Practicality prevents an exhaustive recitation of each individual permutation and combination.

Having described and illustrated the principles of our invention with reference to illustrative embodiments, it will be apparent that the detailed arrangements can be modified in arrangement and detail without departing from such principles.

For example, while reference has been made to various uses of wireless, it should be understood that such reference does not just cover FM broadcast, and wireless internet networking and the like, but also includes other wireless mechanisms. Examples include cell phones and direct satellite broadcast.

Likewise, while certain embodiments were illustrated with a watermark payload of 100+ bits, in other systems much smaller (or sometimes larger) payloads are desirable—sometimes as small as 1–8 bits.

While the foregoing examples have each been illustrated with reference to a particular media type (e.g., video, audio, etc.), it will be recognized that the principles of each embodiment find application with the other media types as well.

Certain of the appliances contemplated above require user interfaces more sophisticated than are presently typical on such devices. The simplicity of the underlying audio appliance can be preserved, in many instances, by using a palmtop computer—coupled by infrared or otherwise—as a temporary user interface to the appliance. Some of the processing capability can likewise be off-loaded to an ancillary palmtop (Palmtop is here meant to refer generally to any pocket-size programmable computing device.) Unless otherwise stated, it should be understood that the digital music, video, and imagery contemplated herein is not of any particular form or format. Audio, for example, can be of various forms, both streaming and non-streaming, and of various formats (e.g. MP3, MP4, MS Audio, Windows Media Technologies, RealAudio, *.WAV, MIDI, Csound, Dolby's Advanced Audio Codec (AAC), etc.

To provide a comprehensive disclosure without unduly lengthening the present specification, applicants incorporate by reference the patent publications and applications cited herein.

We claim as our invention all such embodiments as may come within the scope and spirit of the following claims, and equivalents thereto:

1. A method comprising:

- presenting a digitally encoded object to an optical sensor, the optical sensor producing output data;
- decoding plural-bit data from the sensor output data; and
- using said plural-bit data to establish a link to an internet address having data relating to said object;
- wherein the object is steganographically encoded with said plural-bit data.

2. The method of claim 1 in which the object is a business card.

3. The method of claim 1 in which the object comprises printed advertising.

4. The method of claim 1 in which the object comprises product packaging.

5. The method of claim 4 in which the product packaging comprises a cover associated with packaged music media.

6. The method of claim 1 in which the object comprises a portion of a book.

7. The method of claim 1 in which the object comprises an article of postal mail.

8. The method of claim 1 in which the object comprises printed advertising.

9. The method of claim 1 in which the plural-bit data comprises a code, the method including consulting a data

67

structure to obtain an internet address associated with the code, and initiating a link to said address.

10. A method of initiating access to a computer via a data communications medium, the method comprising:

receiving data corresponding to an object, said object
comprising visual data and having information indica-
tive of an address associated with the computer steganographically embedded in-band within said visual
data;

decoding the information from said object; and
initiating a link to the computer using said information;
said decoding and initiating being performed by the same
device.

11. The method of claim 10 in which said receiving
comprises receiving said object from a digital storage or
transmission medium in digital form, without said object
having being rendered in human-perceptible form since
being steganographically embedded.

12. The method of claim 10 in which said receiving
comprises sensing a human-perceptible form of said object,
as by an optical sensor device.

13. A method of initiating access to a computer via a data
communications medium, the method comprising:

receiving data corresponding to an object, said object
comprising visual data and having information indica-
tive of an address associated with the computer steganographically embedded in-band within said visual
data;

decoding the information from said object; and
initiating a link to the computer using said information;
wherein said receiving comprises receiving said object
from a digital storage or transmission medium in digital
form, without said object having being rendered in
human-perceptible form since being steganographi-
cally embedded.

14. A method of initiating access to a computer via a data
communications medium, the method comprising:

receiving data corresponding to an object, said object
comprising visual data and having information indica-
tive of an address associated with the computer steganographically embedded in-band within said visual
data;

68

decoding the information from said object; and

initiating a link to the computer using said information;
wherein said visual data includes plural samples, said
steganographically embedded information extending
generally throughout said samples, rather than local-
ized in one or more particular portions thereof, wherein
the information can be decoded from an excerpt of said
visual object and used to initiate the link to the com-
puter.

15. A method of initiating access to a computer via a data
communications medium, the method comprising:

receiving image data corresponding to a printed object,
the printed object including both text and background,
at least the background having information indicative
of an address associated with the computer steganographically embedded therein;

decoding the information from said image data; and
initiating a link to the computer using said information.

16. The method of claim 15 in which said information
comprises a code, the method including consulting a data-
base to obtain a computer address associated with said code,
and initiating a link to said address.

17. The method of claim 15 in which the printed object
comprises a business card.

18. The method of claim 15 in which the printed object
comprises printed advertising.

19. The method of claim 15 in which the printed object
comprises product packaging.

20. The method of claim 15 in which the product pack-
aging comprises a cover associated with packaged music
media.

21. The method of claim 15 in which the printed object
comprises a portion of a book.

22. The method of claim 15 in which the printed object
comprises an article of postal mail.

23. The method of claim 15 in which the printed object
comprises printed advertising.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 6,311,214 B1
DATED : October 30, 2001
INVENTOR(S) : Geoffrey B. Rhoads

Page 1 of 1

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Title page.

Item [63], change "which is" to -- and --, after "Apr. 15, 1999" add -- which claims priority to application 60/082,228, filed on April 16, 1998 --.

Column 7.

Line 35, change "data The" to -- data. The --.

Column 19.

Line 34, change "comers" to -- corners --.

Column 52.

Line 38, change "samples pixels)" to -- samples (pixels) --.

Column 57.

Line 1, change "desired In" to -- desired. In --.

Column 58.

Line 11, change "entirely" to -- entirety --.

Column 61.

Line 61, change "watermark In the" to -- watermark. In the --.

Column 63.

Line 5, change "watermark The presence" to -- watermark. The presence --.

Signed and Sealed this

Ninth Day of September, 2003

A handwritten signature in black ink, appearing to read "James E. Rogan", with a horizontal line drawn underneath it.

JAMES E. ROGAN
Director of the United States Patent and Trademark Office

U.S. PATENT DOCUMENTS

5,832,457	11/1998	O'Brien et al.	705/14
5,892,827	4/1999	Beach et al.	380/24
5,933,811	8/1999	Angles et al.	705/14
5,948,061	9/1999	Meriman et al.	709/219
6,026,370	2/2000	Jernya	705/14
6,112,186	* 8/2000	Bergh et al.	705/10
6,134,532	* 10/2000	Lazaus et al.	705/14

OTHER PUBLICATIONS

Booker, E.; "Seeing a Gap, A Palo Alto Startup Will Debut Advertising Server for the Net", Web Week, v.2 iss.2, [online] retrieved from www.internettworld.com. (1996).

Metcalfe, B.; "From the Ether", InfoWorld, v.18 iss.3, [online] retrieved from www.infoworld.com. (1996).

Netgravity AdServer 2.0 Announcement. [online] retrieved from www.netgravity.com (1996).

Internet access: internet marketing revolution begins in the US this Sep., Edge: Work-Group Computing Report, v7 n316, (1996).

Kodha, Y. et al; Ubiquitous Advertising on the WWW: Merging Advertisement on the Browser, Computer Networks and ISDN Systems, vol. 28, No. 11, May 1996, pp. 1493-1499.

The Brodia Group, 38 pages [online], retrieved on May 17, 2000 from www.brodia.com.

Catalina Marketing Corporation, 25 pages, [online], retrieved on May 17, 2000 from www.catmktg.com.

Engage Technologies, Inc., 22 pages, [online], retrieved on Feb. 14, 2000 from www.engage.com.

Gator.com, User's Guide to Gator, Version 1.2, 21 pages, [online], retrieved on Feb. 14, 2000 from www.gator.com, publication date unknown.

Gator.com, Company Information, 23 pages, [online], retrieved on Feb. 14, 2000 from Internet, publication date unknown.

Metabyte Networks, Inc., 19 pages, [online], retrieved on May 17, 2000 from www.metabyte.com.

Privaseek, Inc., 15 pages, [online], retrieved on May 17, 2000 from www.privaseek.com.

* cited by examiner

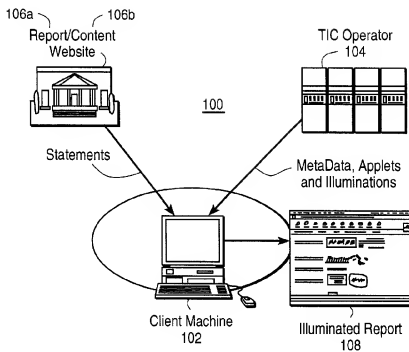


FIG. 1

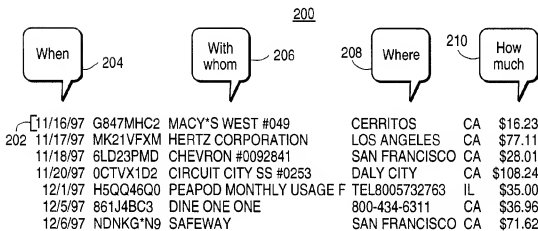


FIG. 2

300

11/16/97	G847MHC2	MACY'S WEST #049	CERRITOS	CA	\$16.23
11/17/97	MK21VFXM	HERTZ CORPORATION	LOS ANGELES	CA	\$77.11
11/18/97	6LD23PMD	CHEVRON #0092841	SAN FRANCISCO	CA	\$28.01
11/20/97	OCTVX1D2	CIRCUIT CITY SS #0253	DALY CITY	CA	\$108.24
12/01/97	H5QQ46Q0	PEAPOD MONTHLY USAGE F	TEL8005732763	IL	\$35.00
12/05/97	861J4BC3	DINE ONE ONE	800-434-6311	CA	\$36.96
12/06/97	NDNKG*N9	SAFEWAY	SAN FRANCISCO	CA	\$71.62

302

FIG. 3A

304 AFTER ILLUMINATION







306 AVIS					
11/16/97	G847MHC2	 307	CERRITOS	CA	\$16.23
11/17/97	MK21VFXM	 307	LOS ANGELES	CA	\$77.11
11/18/97	6LD23PMD	 307	BUILD YOUR OWN MERCEDES-BENZ 308	SAN FRANCISCO	CA \$28.01
11/20/97	OCTVX1D2	 307	DALY CITY	CA	\$108.24
12/01/97	H5QQ46Q0	 307	TEL8005732763	IL	\$35.00
12/05/97	861J4BC3	DINE ONE ONE 310	800-434-6311	CA	\$36.96
12/06/97	NDNKG*N9	 307	SAVE \$2.00 ON: PAMPERS PREMIUM DIAPERS 312	SAN FRANCISCO	CA \$71.62

FIG. 3B



FIG. 4

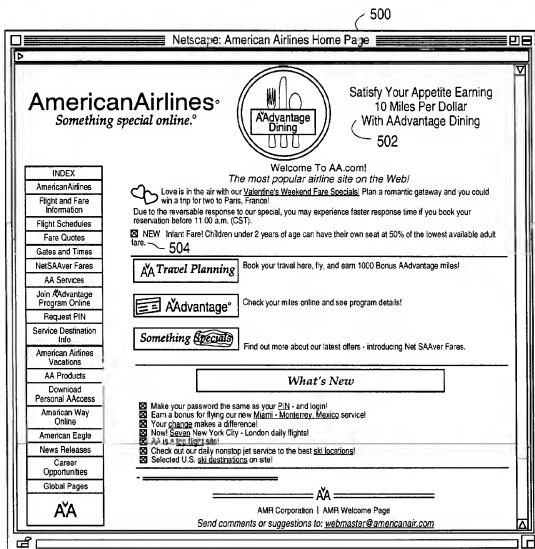


FIG. 5A

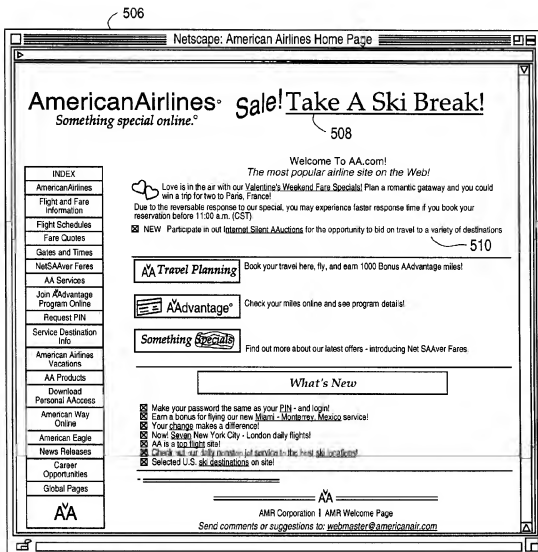


FIG. 5B

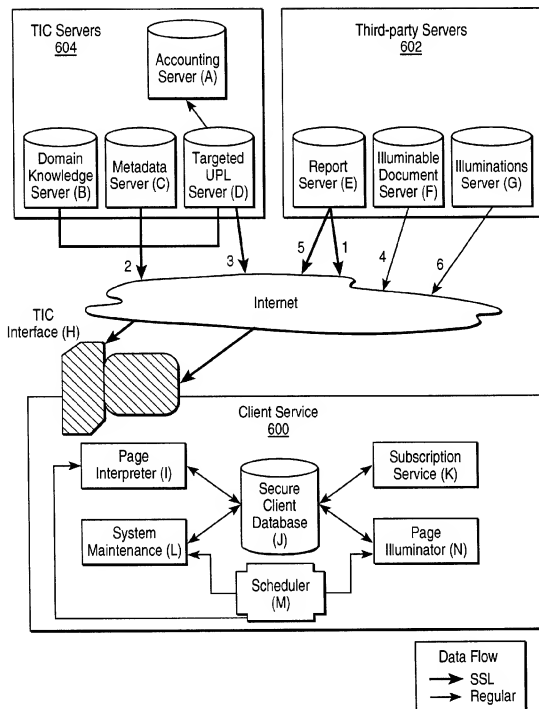


FIG. 6

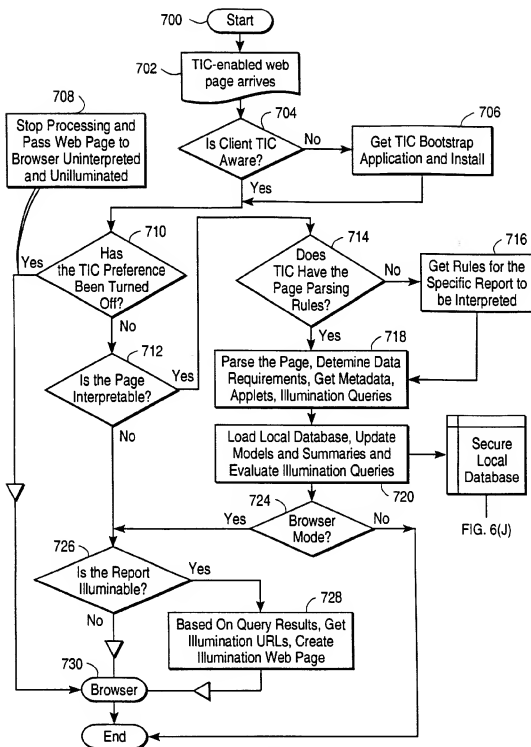
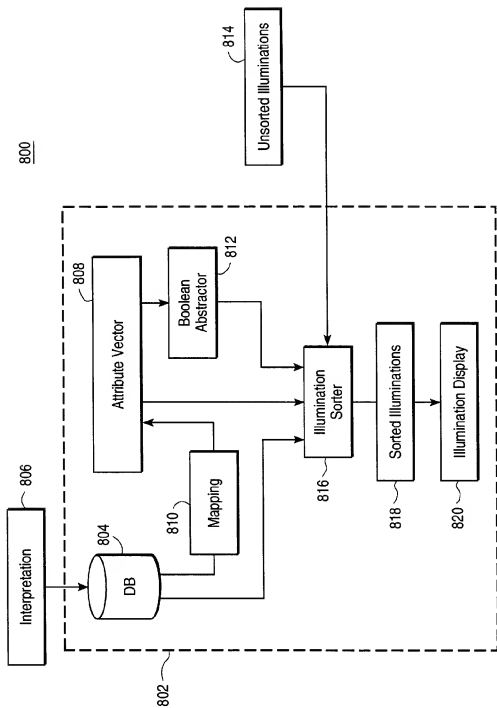


FIG. 7



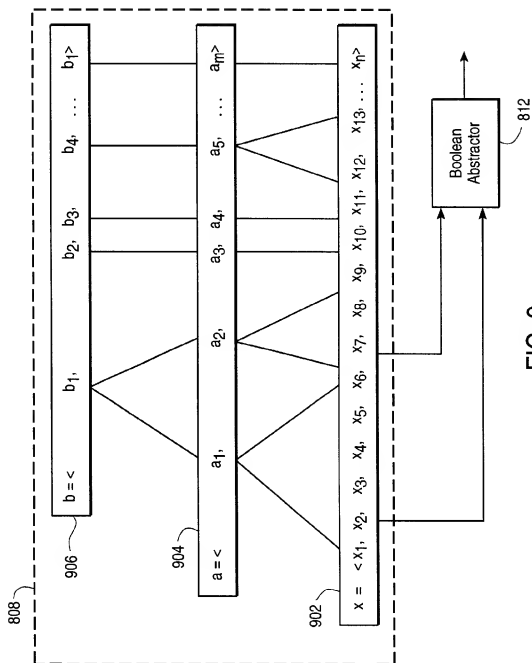
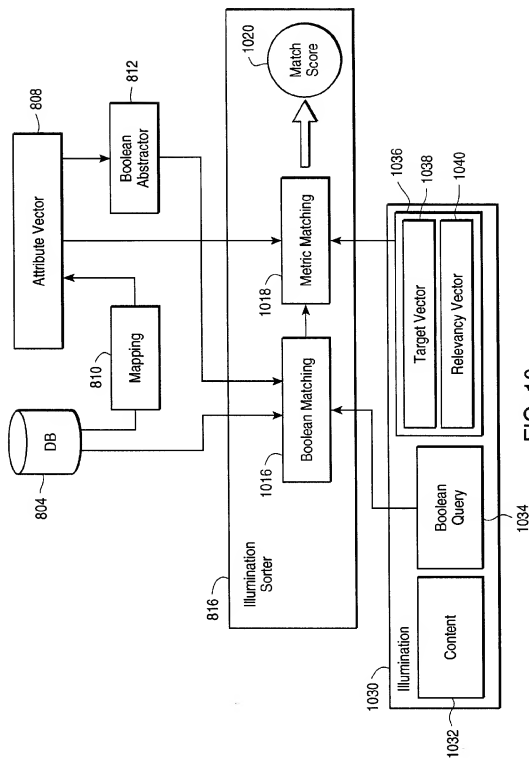


FIG. 9



Preference for shopping at Williams-Sonoma if interested in cooking $P(d x)$	Preference for shopping at Williams-Sonoma if not interested in cooking $P(d \sim x)$	Transaction number (where 0 = initial estimate)	Interest in cooking given a transaction at Williams-Sonoma $P(x)$
0.1	0.02	0	0.001
0.1	0.02	1	0.005
0.1	0.02	2	0.024
0.1	0.02	3	0.111
0.1	0.02	4	0.385
0.1	0.02	5	0.758
0.1	0.02	6	0.940
0.1	0.02	7	0.987
0.1	0.02	8	0.997

1104 1106 1108 1110

FIG. 11A

Preference for renting a car if interested in travel $P(d x)$	Preference for renting a car if not interested in travel $P(d \sim x)$	Transaction number (where 0 = initial estimate)	Interest in travel given a transaction involving renting a car $P(x)$
0.5	0.05	0	0.001
0.5	0.05	1	0.010
0.5	0.05	2	0.091
0.5	0.05	3	0.500
0.5	0.05	4	0.909
0.5	0.05	5	0.990
0.5	0.05	6	0.999
0.5	0.05	7	1.000
0.5	0.05	8	1.000

1114 1116 1118 1120

FIG. 11B

Preference for no cooking store transactions if interested in cooking	Preference for no cooking store transactions if not interested in cooking	Preference for shopping at Williams-Sonoma if interested in cooking	Preference for shopping at Williams-Sonoma if not interested in cooking	Period (where 0 = initial estimate)	Interest in cooking given a transaction at Williams- Sonoma
$P(n x)$	$P(n \sim x)$	$P(d x)$	$P(d \sim x)$		$P(x)$
		0.1	0.02	0	0.001
				1	0.005
		0.1	0.02	2	0.024
0.9	0.98			3	0.022
		0.1	0.02	4	0.103
		0.1	0.02	5	0.365
0.9	0.98			6	0.345
0.9	0.98			7	0.326
		0.1	0.02	8	0.708

1202

FIG. 12A

Preference for no car rental transactions if interested in travel	Preference for no car rental transactions if not interested in travel	Preference for renting a car if interested in travel	Preference for renting a car if not interested in travel	Period (where 0 = initial estimate)	Interest in travel given a transaction involving renting a car
$P(n x)$	$P(n \sim x)$	$P(d x)$	$P(d \sim x)$		$P(x)$
		0.5	0.05	0	0.001
		0.5	0.05	1	0.010
		0.5	0.05	2	0.091
		0.5	0.05	3	0.500
		0.5	0.05	4	0.909
0.9	0.99			5	0.901
0.9	0.99			6	0.892
0.9	0.98			7	0.883
0.9	0.98			8	0.872

1222

FIG. 12B

	$P(s x)$	$P(s \sim x)$	$P(v x)$	$P(v \sim x)$	$P(n x)$	$P(n \sim x)$	Initial values for preferences	Preference values at end of period 1, containing one purchase at SportsMart	Preference values at end of period 2, containing no sports-related purchases	Preference values at end of period 3, containing one purchase at VolleyballWorld
x 1 basketball	0.1	0.02			0.9	0.98	0.010	0.048	0.044	0.041
x 2 baseball	0.1	0.02			0.9	0.98	0.010	0.048	0.044	0.041
x 3 football	0.1	0.02			0.9	0.98	0.010	0.048	0.044	0.041
x 4 volleyball	0.1	0.02	0.25	0.01	0.9	0.98	0.010	0.048	0.044	0.537
x 5 tennis	0.1	0.02			0.9	0.98	0.010	0.048	0.044	0.041
x weighted sum	indicating interest in sports/general						0.010	0.048	0.044	0.140

1304 1306 1308 1310 1312 1314 1316 1320 1322 1318

1302

FIG. 13A

	$P(s x)$	$P(s \sim x)$	$P(v x)$	$P(v \sim x)$	$P(n x)$	$P(n \sim x)$	Initial values for preferences	Preference values at end of period 1, containing one purchase at VolleyballWorld	Preference values at end of period 2, containing no sports-related purchases	Preference values at end of period 3, containing one purchase at SportsMart
x 1 basketball	0.1	0.02			0.9	0.98	0.010	0.009	0.008	0.041
x 2 baseball	0.1	0.02			0.9	0.98	0.010	0.009	0.008	0.041
x 3 football	0.1	0.02			0.9	0.98	0.010	0.009	0.008	0.041
x 4 volleyball	0.1	0.02	0.25	0.01	0.9	0.98	0.010	0.202	0.188	0.537
x 5 tennis	0.1	0.02			0.9	0.98	0.010	0.009	0.008	0.041
x weighted sum	indicating interest in sports/general						0.010	0.048	0.044	0.140

1334 1336 1338 1340 1342 1344 1346 1348 1350 1352 1354

1332

FIG. 13B

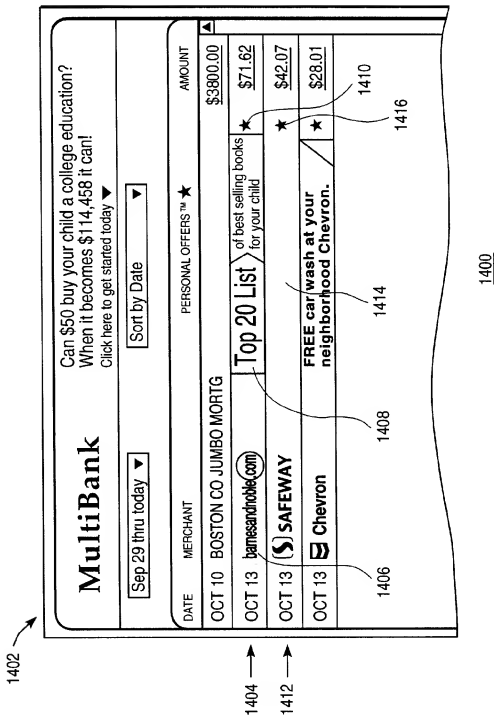


FIG. 14

1402

MultiBank

Can \$50 buy your child a college education?
When it becomes \$114,458 it can!
Click here to get started today ▼

Sep 29 thru today ▼

Sort by Date ▼

DATE	MERCHANT	PERSONAL OFFERS™ ★	AMOUNT
OCT 10	BOSTON CO. JUMBO MORTG		\$3800.00
OCT 13	barnesandnoble.com	Beanie Baby Giveaway! ★	\$71.62
OCT 13	SAFEWAY	★	\$42.07
OCT 13	Chevron	FREE car wash at your neighborhood Chevron. ★	\$28.01

1404 →

1412 →

1406

1508

1414

1410

1416

1500

FIG. 15

1402

MultiBank

Can \$50 buy your child a college education?
When it becomes \$114,458 it can!
Click here to get started today ▼

Sep 29 thru today ▼

Sort by Date ▼

DATE	MERCHANT	PERSONAL OFFERS™ ★	AMOUNT
OCT 10	BOSTON CO JUMBO MORTG		\$3800.00
OCT 13	barnesandnoble.com	Top 20 List of best selling books for your child	\$71.62
OCT 13	SAFeway	Thursday Night Beer Tasting	\$42.07
OCT 13	Chevron	FREE car wash at your neighborhood Chevron.	\$28.01

1404 →

1412 →

1406

1408

1614

1410

1416

1600

FIG. 16

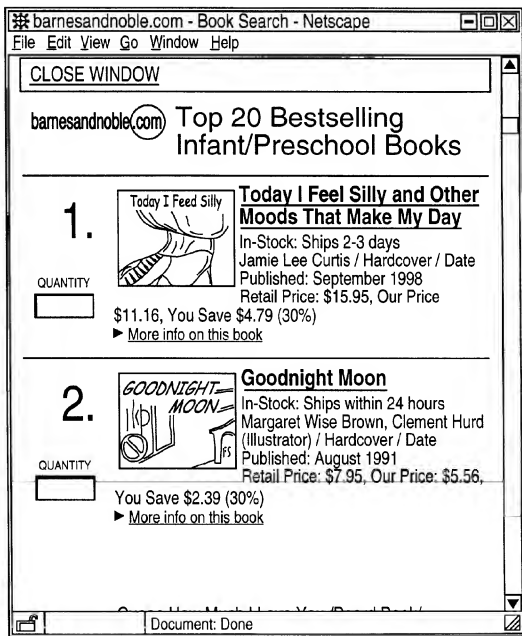


FIG. 17

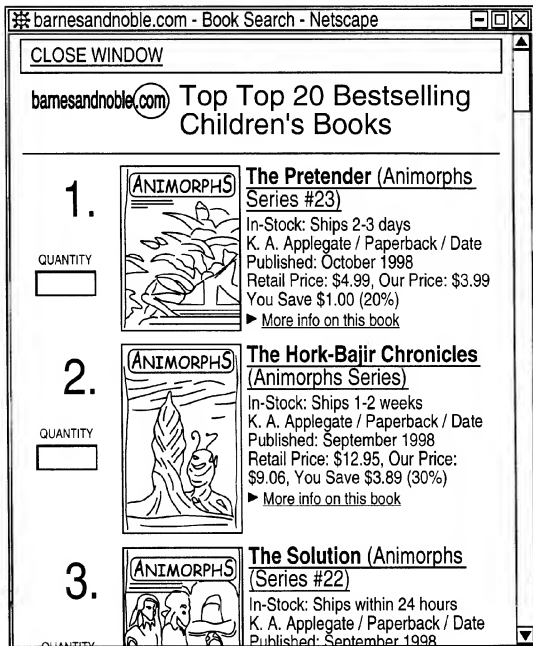


FIG. 18

1

HIERARCHICAL MODELS OF CONSUMER ATTRIBUTES FOR TARGETING CONTENT IN A PRIVACY-PRESERVING MANNER

CROSS REFERENCE TO RELATED APPLICATION

This application is a continuation-in-part of U.S. application Ser. No. 09/235,610, filed Jan. 20, 1999, which claims the benefit of U.S. Provisional Application Ser. No. 60/091,979, filed Jul. 7, 1998.

BACKGROUND

1. Field of the Invention

The present invention relates to the creation and maintenance of models of consumers, based upon transactional data extracted from structured information received via electronic channels and viewed by the consumer, and the use of those models to aid in presenting targeted content, such as advertising or special offers, in a way that does not compromise the consumer's privacy.

2. Background

Consumers today receive a tremendous amount of information via electronic systems. Many consumers access the Internet or private networks to review information such as personal bank statements, credit card reports, stock portfolios, online account balances, online transaction receipts, commercial web sites, personal home pages, and the like. Some of this structured information reflects consumer behavior that occurs "off-line" such as credit card transactions made at retail establishments, debit, check or other bank transactions, while some of the structured information represents entirely online behavior (including both commercial and non-commercial behavior). Online behavior also includes behavior that is not directly commercial in nature, such as click-through behavior in using the Internet. This type of behavior is captured in structured documents such as URL (Uniform Resource Locator) history files stored on the user's computer.

A key goal of most businesses is to target consumers with products and services that is of interest to the consumer based on their interests, preferences, or demographics. Thus many attempts have been made to determine consumer's interests and provide content (e.g. promotions, advertisements) to products and services that match such interests.

Historically, for many types of their transactions, such as credit or banking transactions, consumers received printed statements from credit card companies, bank, and other financial institutions. The paper statement themselves typically only contain limited information identifying each transaction, its amount, date, and so forth. To enhance the advertising opportunities provided when the consumer is reviewing their printed statement, these institutions often add additional promotional insert documents to the statement, in the hope that the consumer will review these separate documents and be motivated to purchase the advertised products or services. Only limited targeting of the content of the advertising inserts has been possible in the past.

With the rise of consumer use of the Internet, advertisers have sought out ways to target promotional information to consumers viewing web pages and the like. On the World Wide Web, "banner" advertising is typically used to promote products or services to consumers viewing various web pages. Many web sites attempt to target banner advertising

2

based on the content of a user's input, typically a search request, or other consumer input that is processed by the web site. However, targeting based on a single consumer input does not necessarily result in banner advertisements that actually are of interest to the consumer. This is because consumers frequently search for or desire information that is not necessarily related to their general interests, preferences, or demographics. Even when consumers are searching for information related to their interests, their online behavior may only reflect a small portion of their interests, and the relative importance of certain interests while online may be vastly different than the importance of the same interest when the consumer is off-line. Thus, online behavior may not be indicative of interests that are likely to lead to transactions being consummated online.

Some web sites attempt to target consumers by storing databases that contain some type of identifying data for each consumer. When a consumer accesses a web site coupled to the database, a targeted advertisement may be selected based on the consumer's data. However, this approach suffers from a loss of privacy to the consumer since personal information about some of their behaviors (typically only their click-throughs at the web site) are recorded, as this information is stored in the database without their consent or control. At present, the owner of the web site is typically free to use this consumer information as they see fit. In addition, the consumer information is often based on very limited information about the consumer that either does not accurately reflect their true interests and preferences or does not change automatically in response to both off-line and online consumer behavior. Furthermore, this information is normally limited to a consumer's prior interaction with that particular web site. While, new services are arising which attempt to share consumer information among unrelated websites, such mechanisms may violate consumer privacy and potentially consumer protection laws in various jurisdictions throughout the world.

Accordingly, it is desirable to provide a system, method, architecture and various software products that can augment structured documents that are received and reviewed online by a consumer using historical behavioral information about the consumer, including either online or off-line behavior, while ensuring the personal privacy of each consumer.

SUMMARY OF THE INVENTION

The present invention overcomes the limitations of conventional models and targeting methods for delivering custom content to consumers that matches their interests, preferences, demographics, or psychographics. Existing systems make use of data warehouses that aggregate information from a variety of sources, create demographic segments with associated consumer preferences, decide which segment or segments a consumer occupies, and sends information relevant to that segment to the consumer.

The present invention builds upon the analyzing or "interpreting" of structured documents delivered electronically to the consumer for information to create a consumer profile of the consumer based on a broad spectrum of both online and offline behaviors and transactions. In particular, a detailed model of the consumer is built using mathematical functions that map from the specific transactions of the consumer to estimates of the relevancy of certain attributes to the consumer. These models can be used to order a number of pieces of conditional content with respect to how well they match the attributes of the consumer, and hence how well they may appeal to the consumer's interests, preferences,

3

psychographics, or demographics. Display methods in an illumination process, which augments structured documents being electronically delivered to the consumer with the conditional content, allow for the consumer to view the most appropriate piece of content first (by its ordering), followed by the next most appropriate piece of content if the consumer so indicates, and so forth. A content rotator may be used by a consumer to selectively view an ordered set of conditional content.

The consumer profile is continually updated with information extracted from electronically delivered structured documents and from consumer behavior such as selection of content, and thus reflects an accurate and current assessment of the consumer's interests, preferences, and demographics. The consumer profile may also be updated with information received about merchants, products, or consumer model parameters received from remote sources over a network. Changes in a consumer's interests, preferences, and demographics are assumed to be reflected by changes in their behaviors, as reflected through commercial and non-commercial transactions.

The consumer attributes may be defined in a hierarchical model, with aggregated attributes having values derived from lower level attributes (either themselves aggregated, or base level attributes). In this way arbitrarily complex queries can be evaluated against the model to target very specific consumers. The hierarchical model further allows recursive selection of conditional content, with initial selection of content using higher levels of aggregated attributes, and subsequent selection using a combination of lower levels of attributes on which the higher levels are based and consumer expression of interest in each level of selected content.

The consumer attributes are updated by the relevancy of individual transactions. Relative recency of transactions, and the probabilities of transactions occurring or not occurring may also be used to update the attributes.

One embodiment of the present invention, as described herein is an integrated system of software, knowledge bases, and processes which enables the following functionality:

creation of a model consisting of a vector of data values, such that each of the values represents some attribute of the consumer; psychographic qualities, specific interest attributes, income level, etc., using facts in a consumer database of the consumer, plus a mathematical framework for interpreting the vector of values.

grouping of elements of the model into a hierarchical framework that aids in a successive refinement of consumer attributes.

the use of the database and models to target and personalize otherwise generic content delivered to the consumer in electronic form and including conditional content selected and ordered based on the consumer model, without the creator of the content having any knowledge of the consumer, his transactions or the results of models.

presentation mechanisms for enabling the consumer to selectively view the conditional content according to its ordering.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an illustration of a system in accordance with the present invention.

FIG. 2 is an illustration of a sample structured document.

FIGS. 3A and 3B illustrate an illuminated credit card statement.

4

FIG. 4 illustrates four example illuminations of a template document.

FIGS. 5A and 5B illustrate examples of an illuminated web pages.

FIG. 6 is an illustration of the client and server side architecture for a World Wide Web implementation.

FIG. 7 is a flowchart of the client-side procedures for interpreting and illuminating web-based structured documents.

FIG. 8 is an illustration of a system for using hierarchical consumer models for illuminating documents.

FIG. 9 is an illustration of a hierarchical attribute vector.

FIG. 10 is a flow diagram of the illumination sorting process.

FIGS. 11a and 11b are tables illustrating updating of the attribute vector.

FIGS. 12a and 12b are tables illustrating updating of the attribute vector with decaying of older transactions.

FIGS. 13a and 13b are tables illustrating updating of the attribute vector including aggregated attributes.

FIG. 14 is an illustration of an illuminated credit card statement with the content rotator.

FIG. 15 is another illustration of the illuminated credit card statement after activation of the content rotator.

FIG. 16 is another illustration of the illuminated credit card statement after activation of the content rotator.

FIG. 17 is an illustration of the effect of hierarchical discrimination of content.

FIG. 18 is another illustration of the effect of hierarchical discrimination of content.

DETAILED DESCRIPTION

A. Terminology

The present invention may be understood by use of the following terminology:

A "consumer" is a person or organization that uses a commodity or service. In this context, it may be an individual or a collection of individuals acting as a consuming unit (e.g. a household, a company);

A "transaction" is an event where some amounts of resources or information are exchanged between the consumer and a vendor (or content provider) at some particular time or over some particular time interval;

A "model" is a mathematical function which attempts to predict the appeal to the consumer of future transactions based on interests and behavior derived from past transactions, and consists of an attribute vector and a set of mapping functions;

An "attribute vector" is a vector of data values such that each element of the vector represents an attribute of the consumer;

A "mapping function" is a mathematical function that is used to convert between factual information (such as data regarding a transaction or whether an individual is pregnant) and elements of an attribute vector;

"Targeting" is the selection of what material to present to a viewer based on interests, needs, capabilities, and other attributes of the consumer and/or viewer;

An "illumination" is a piece of targeted content, plus query information used to determine the degree to which the content matches the attributes of the consumer model.

B. System Overview

Referring now to FIG. 1, there is shown one embodiment of a system in accordance with the present invention. The system 100 includes:

A local access device 102 with local memory, computing capability, persistent storage, a display, and a network connection (e.g., a personal computer with a modem connected to an Internet Service Provider or an intelligent television set-top box connected to a cable head-end).

One or more TIC enabled data servers 104 on the network which download software and provide generic information (i.e. information not specific to any particular consumer) that can be used to parse transactional or behavioral information in structured documents to construct the personal database, develop the models of the consumer and deliver pointers (or other references) to content alternatives whose selection is based on the consumer models or queries to the personal database.

One or more servers 106a which distribute online transaction reports whose format is known to the system.

One or more servers 106b which distribute content 108 which includes embedded tags and queries. A report server and content server may be one and the same, as illustrated in FIG. 1.

An embodiment of the present invention for use with the Internet is further described below with respect to FIG. 6.

C. Illumination and Interpretation

The present invention includes two major independent processes: interpretation and illumination.

Interpretation refers to the process of parsing and analyzing reports and other structured documents used by TIC to construct the personal database and models of the consumer. The data sources, on which the model is based, include any of the consumer's transaction reports which may be accessible to his local computing device either directly or via the network. Such reports may include credit card statements, bank statements, electronically presented bills, investment portfolios, medical reports, purchase receipts, tax forms, URL history files generated by the browser, forms filled in by the viewer and any other parsable and interpretable data about the consumer which may become available in electronic form. Since such reports provide generally accurate and very detailed data on a wide range of an individual's activities, both online and off-line, the models developed by TIC can be extremely accurate and complete.

Report formats, including information necessary for parsing the report data and using the data to update the user-model, may be self-describing, i.e. embedded as metadata in the form of annotation tags in the report itself, or indexed by report source in some globally accessible database managed by the TIC operator. Virtually any sufficiently structured document available to the user's device can serve as a data source for TIC. These could include databases, logs, and reports maintained and/or generated directly by the user himself or by software running on the user's computer. Examples include databases and reports generated by personal finances software, tax preparation software, loan applications, calendars, URL history files generated by web-browsers, listings of software residing on the user's computer, and reports of currently active processes and windows on the user's computer.

Because of the nature and level of detail of the information available in the TIC model, the user of TIC will require a high degree of privacy. The privacy that TIC provides is that no information collected, generated or inferred by TIC ever leaves the user's control. The data and inferences are used entirely on the user computer for the purpose of

customizing and personalizing content for the user. With respect to TIC, personal information about the user only flows from external sources into the user computer (and the locally-controlled storage device). The user may use information presented by TIC to communicate back to content providers but that is done explicitly by the user independently of TIC.

Referring to FIG. 2, there is shown a pictorial example of an example structured document, here a credit card statement 200, and the types of information that may be usefully extracted during interpretation in order to update a consumer profile. For a structured document such as a credit card report, interpretation extracts information about each transaction 202, such as the date/time 204 of the transaction, the entity 206 with whom the transaction occurred, the location 206 of the transaction, and the amount of resources 210 (here measured in dollars) committed by the consumer to the transaction. The extracted information here can be used to both update the consumer model and to add new facts about the consumer's transactions, preferences, or interests to the database.

Illumination is the process of annotating or replacing sections of documents or other media with (possibly) related multimedia content. Typically the new content expands on the information in the original content and/or provides a more interesting presentation of the information. As examples, the name of a company or product might be illuminated with a graphical logo or a hyperlink to a home page, a video presentation, or a presentation for some completely different product or company; an input field in a form may be illuminated by replacing it with the information being requested; an empty spot in a video broadcast may be replaced with a commercial. The choice of illumination for a given section may depend on the content of the section, the overall content of the document, the choices made for illuminating other sections, the context such as time and location in which the content is being viewed and attributes or profile of the viewer. The illumination may occur at any point in the production and delivery process for the media. The degree of flexibility and context dependence in the choice of illumination will depend on how early or late in the process the illumination occurs and how much information about the context is available to the illuminator. This flexibility ranges from static content (i.e. content that is the same for all viewers and contexts) to viewer-specific content (i.e. content which may vary for each viewer).

FIGS. 3A and 3B illustrate an example illumination of a credit card statement. In FIG. 3A there is shown a credit card statement 300 as it would appear on a consumer's computer without the benefit of illumination according to the present invention. Such a statement 300 would be transmitted electronically from the computer system of a credit card company (or comparable financial institution) to the consumer's personal computer for review, and perhaps payment of outstanding balances. This statement 300 simply lists each transaction 302 as a simple line of text, with the normal descriptors of date, merchant name, transaction identifier, location, and amount. The opportunities for targeted advertising based on these individual transactions are wasted.

Now considering FIG. 3B, there is shown the credit card statement 304 after illumination in accordance with the present invention. First, many of the simple text-only merchant names have been replaced by graphic icons 307 illustrating the merchant's particular trademark or mark. This reinforces brand identity right at the point the consumer is reviewing a particular transaction with the merchant. Second, co-branding is facilitated by the inclusion in some

transactions of a graphic icon **308** for second merchant's goods/services. For example, in the transaction line for the Chevron® charge, an icon **308** for Mercedes-Benz® cars is included. The selection of which second merchant's icon **308** to include in the transaction is based on the consumer's profile which is used to select one of a number of variable content alternatives that are encoded in the credit card statement when it is received electronically.

Third, illumination provides for the replacement of static text, such as the merchant's name, with a hyperlink **310** to the merchant's web site (or any other web site, as determined by the selectable content alternative data). Thus, here illumination transforms the otherwise static credit card statement into a dynamic document that allows the consumer to immediately access more information about a merchant during the process of reviewing the credit card statement.

Fourth, illumination provides for the insertion of promotional content **312** into specific transactions. In the illustrated example, a promotional coupon is for the product of merchant other than the merchant of the transaction. This facilitates co-marketing campaigns by groups of merchants. The selection of which merchant's coupons to include in the illuminated transaction are again based on the profile of the consumer and the attributes of each selectable content alternative that is encoded in the statement for this transaction. Thus, different consumers having a transaction with the same merchant may receive entirely different coupons **312** or co-branding icons **308** because of differences in their personal consumer profiles.

Finally, note that the top portion of the statement **304** has been augmented by the inclusion of a graphic icon **306** for yet another merchant, one who in this case does not have any transactions specifically listed with the consumer in the credit card statement. As is more fully described below, the selection of this icon **306**, and other illumination elements (e.g., **307**, **308**, **310**, and **312**) may be usefully managed by policies associated with different sections of a structured document (e.g., the header portion, each transaction line, footer, etc.), and the structured document itself, where the document sections have respective owners which define the policies for illumination. The use of policies further extends the opportunities for controlled targeting of promotional information, since each section of a structured document may have policies that differently influence the selection of content alternatives relative to a consumer's profile.

The examples of FIGS. 3A and 3B illustrate illumination for a credit card statement; illumination can be applied to any type of structured document generally so long as it is formatted with the information describing the selectable content alternatives, in accordance with the present invention, including any type of financial statement generally (e.g., bank statements or stock portfolio statements), or transaction statement generally (e.g., commercial transactions with a service or product vendor).

D. Example Applications of the Invention

1. Substitution of Information and Multimedia Content in Document Templates

In this simplest of applications of ITC, a document or other form of media have the form of templates. The templates contain both static content and variable content sections. The variable content sections are tagged with variables or expressions, which are evaluated in the context of a client database to produce a description of the actual content to display in that section. For example, if the client database includes the name of the viewer as the value of a variable viewer.name then a document could be addressed to each specific viewer by specifying a variable section with tag viewer.name.

FIG. 4 illustrates this application. Here an electronically presented coupon **400** includes a variable section **402** that is encoded with a variable for the consumer's name, each of the four coupons illustrated has been customized in this manner from a same basic template. Upon presentation at the consumer's computer, the consumer's name is retrieved from the client database and inserted into the variable section, resulting in a customized coupon.

Similarly tags could be used to specify the logo or URL or other contact information for a specific merchant or organization as in merchant.logo(merchantID=123456). These tags could be evaluated at any point in the production process including the context of the individual viewer.

2. Customized World Wide Web pages

Another type of structured document are web pages that are sent in the form of HTML annotated documents over an intranet or Internet and viewed using a World Wide Web browser, such as Netscape Corporation's Communicator or Microsoft Corporation's Internet Explorer. The HTML tags determine the form and content of the various elements of the documents. Typically, these tagged elements include references to other documents which are loaded as the tags are evaluated by the browser.

For this application of ITC, special tags are included in the document wherever selectable content is desired. These selectable content tags will include information which is evaluated with respect to the individual consumer's profile to produce a set of options for which content to present together, with criteria for determining a measure of appropriateness of each option depending on the attributes of an individual viewer. Examples of such attributes might include the age and gender of the viewer, her income level, whether she owns her home, dines out often, travels to Asia, has a pet, or whether she is interested in science. Based on its model of the viewer, TIC will evaluate the criteria for each option and choose the option with the highest measure of appropriateness. The consequence is that two different viewers of the same URL to a TIC enabled page could be presented with very different content and have a very different experience.

FIGS. 5A and 5B illustrates two examples of this application. In FIG. 5A there is shown a sample web page **500** that has been illuminated and augmented in view of the consumer profile of a new family. Here, the web page **500** is the home page of a merchant, and has been augmented to include information pertinent to the interests of the consumer/new family. For example, in the top portion of the web page, promotional information **502** for a dining program has been inserted, and in light of the new family's changed consumption patterns (e.g., repeated purchases of diapers indicates the presence of a baby in the family), information **504** promoting infant-related services of the merchant of interest to the new family has been included in the third line of web page.

Referring now to FIG. 5B, this same merchant's home page has been illuminated differently for a different consumer, here an unmarried skier. In this web page **506**, the top portion now has a different promotional item **508**, promoting a ski vacation. Similarly, since to the transactions of the unmarried skier did not imply the presence of children, the third line of the web page now includes different promotional information **510**, this time for a travel action.

This example shows has a templated web page can be augmented with information that is particularly based on the consumer profile of the consumer viewing the web page. This approach differs from existing "personalized web

pages," (e.g. "My Yahoo" at Yahoo.com) since the consumer profile is based on the transactional behavior of the consumer from both online and off-line behavior, instead of a mere list or specification of static preferences and selections by the consumer (e.g. selections by the consumer of which news topics, stock names, etc. to include on the personalized page). In the foregoing examples, the consumer did not preselect which promotional information was of interest to her prior to visiting that merchant's web site. Indeed, no previous contact by the consumer to the web site was even necessary. Instead, the selection of information to illuminate the web page was made dynamically based on the consumer profile, even the very first time the consumer visited the web site. Another difference with existing approaches to "personalized web pages" is that the consumer profile is stored under the control of the consumer's computer. This method provides an extra level of privacy protection.

The range of selectable content for a web page or other structured document is unlimited. This application of TIC can be used for example to implement a personalized web based magazine where articles are chosen and presented according to the viewer's interests and preferences. This application can also be used to allow very accurate targeting and personalization of advertisements and other kinds of commercial offers.

3 Automatic Completion of Fields in Electronic Forms

This application illustrates both the illumination and the interpretation functions of TIC. When presenting a form to a user, TIC can treat it as a template in which the input fields of the form are treated as expressions which evaluate to the corresponding user data.

For example, fields like name, address, social security number, marital status, annual income, are tagged and those whose values are available in the client database are automatically filled in before the form is presented to the user. This part of the application utilizes the illumination component of TIC. When the form is submitted, after filling in unfilled-in fields or changing fields pre-filled by TIC, TIC treats the form as a document to be interpreted. Thus, information in tagged fields whose values were not known to TIC, or for which the values have changed from those in the model, is extracted by TIC and used to update and extend the personal information in the client database.

4 Targeted TV Commercials

This application of TIC is based on the observation that the bandwidth available for TV broadcast via cable or satellite is greater than necessary to support standard broadcast programming. One of the options for the excess bandwidth is to broadcast multiple commercials and other kinds of announcements simultaneously together with selection criteria. A television set-top box equipped with TIC selects the most appropriate of the possible commercials and announcements.

For two-way interactive TV, an alternative is for TIC to target content in a manner similar to that proposed for a world-wide web implementation. That is, instead of sending down multiple commercials simultaneously with selection criteria, only the criteria need be sent down a much smaller data pipe. The set-top box or interactive television can evaluate the selection criteria against the local database and request the appropriate commercial from the head-end.

The next section further describes one embodiment of the present invention.

E. Basic Concepts

1. Products, Consumers, and Viewers

By a "product," there is meant any object or activity which may be used for any purpose and whose use can be

observed either directly or indirectly through some form of report, i.e. a structured document electronically delivered. The use of a product is called "consumption." Any individual or group of individuals acting as a consuming unit of products will be referred to as a "consumer." Typically, the set of individuals making up the consumer unit represented in the totality of transaction reports analyzed by TIC will be a superset of the set of individuals actually viewing content at any particular time. The term "viewer" is used to distinguish the entity (which may itself be a collection of individuals) actually viewing the targeted content on a consumer computer from the consumer unit as a whole. For example, a newborn will not participate as a viewer of targeted content, but will be a part of the total consuming unit. So, in general, infant products will be relevant to the consumer unit, which includes a newborn. However, depending on lifestyle, one individual may have more responsibility for the newborn than others may have, and thus knowing which individual is viewing the content is important for targeting content for the newborn. In general, the appeal of a given product or activity will depend both on the needs and interests of the consumer unit as a whole and on the special needs and interests of a particular set of viewers. A query used for targeting content may reference both.

2. Profiles: Facts and Models of Consumers and Products.

TIC distinguishes between "facts" and "models" and allows targeting of content based on either or both. Facts include information obtained by direct observation, extracted from transaction reports, or supplied by generic product fact databases. Examples of facts include information about individual transactions, statistical summaries of transactions (totals, averages, etc.), personal information obtained from forms, and generic contact, relationship and classification information about products and merchants. A targeting query based on facts might ask, for example, about purchases of particular products or classes of products from particular merchants or classes of merchants. A "model" means a theoretical or mathematical construct developed from facts and used to make conjectures and predictions about the consumer's current and/or future state and behavior. A consumer profile comprises the consumer model and a database including facts pertinent to the consumer. Within TIC, the function of a model is to predict the degree of appeal a given product has to a given consumer at a some time.

F. Components of a TIC Model

TIC can support a variety of models, even simultaneously, within a common framework. In one embodiment, a TIC model consists of the following components;

50 1. An Array of Characteristic Values

The basis for a TIC model is a choice of characteristic values which together form a model of a given consumer or product at a given time. The nature of these characteristics and their values is a property of the model. For example, one approach is to characterize an individual in terms of certain behavioral attributes, such as conservatism, social consciousness, status consciousness and so forth. Another approach is to characterize behavior in terms of the degree to which the behavior correlates with certain archetypes such as the mom, the businessman, the professional woman, and so on. Alternatively, the characteristics may have little or no intuitive meaning. They may simply be formal mathematical constructs determined by some statistical analysis of consumer behavior. TIC does not limit the choice of characteristics or their interpretation except to assume that the values of characteristics can be represented as a real number.

11

The characteristic values for an object will be represented as a vector of real numbers where each value measures the degree to which the corresponding characteristic applies to the consumer or product. For example the value of the conservative attribute may have a value between 0 and 1 where 1 represents complete conservatism and 0 represents complete radicalism. The vector of characteristic values for a consumer represents a model of his interests and the vector of characteristic values for a product represents a model of the appeal of the product.

2. An Appeal Function

In general, the greater the correlation between a consumer profile and a product profile at a given time, the greater will be the expected appeal of the product to the consumer. An "appeal function" is a procedure that computes the appeal of a given product to a given consumer as a function of the consumer and product profiles. For example, an appeal function may be based on a generalized inner product of the consumer and appeal profile, e.g. a weighted sum of the results of multiplying each corresponding pair of characteristic values.

3. An Assignment of Appeal Profiles

Consumer profiles are developed from an analysis of the consumer's past transactions. The contribution a given transaction makes to the consumer profile is assumed to depend on the appeal profile of the product consumed in the transaction, the time of the transaction, and the amount of resources committed by the consumer to the transaction. In order to make use of a transaction for modeling, the product must have a pre-assigned appeal profile. Typically, appeal profiles for merchants or products will be assigned a priori based on known statistics, market research or the intuitive knowledge of experts. In addition, with the explicit permission of randomly selected consumers, consumer profiles can be fed back to the model in order to refine appeal profiles.

4. Consumer Profile Update Process

The maintenance of the consumer profile is an on-going iterative process. Prior to having any knowledge of transactional data about the consumer, the consumer is assigned an initial profile based on known demographic information. The consumer profile update process analyzes each newly interpreted transaction, in particular, product or merchant profile, time of transaction and transaction amount to produce a refined profile. Typically, this process will depend on more than the current profile and the new transaction. It will probably also require the maintenance of aggregates and other summary data about the profile and transaction histories over various time intervals. As an example, it may require maintaining totals of resource consumption for each characteristic over various intervals, remembering specific transactions, such as purchases exceeding some threshold amount, and changes in profile over various intervals.

G. Overview of TIC Components

The TIC system is divided into clients and servers. A client system is one used by a viewer. A TIC server system is one external to client systems and which provides TIC software and generic information used by the client system for interpretation and selection. Except for providing information requested by the client, all the important TIC processing (i.e. interpretation and selection) takes place on the client system. In addition to TIC servers, the TIC environment includes third party servers which provide report data for interpretation, illuminated content, and/or content requiring illumination. Either TIC or third-parties may also provide physical disk storage for encrypted data which is logically under the control of the client system.

12

1. Client Side Components

The client side of TIC consists of a database which represents the TIC model of the consumer together with methods which populate the database (from document interpretation) and use the model for targeting and personalization of content.

a) Consumer Information

All personal information regarding a consumer is represented and stored as objects in the TIC database under the control of the consumer's viewing device. Selection criteria are implemented as queries against this database and may reference facts ("Are there any known transactions with Macys?"), models ("Is it likely that someone in the family is pregnant?"), or both.

The database of information about consumers maintained by TIC includes the following components.

b) Facts Database:

The facts database includes personal information (e.g. name, address, social security number) about consumers, transactions histories (e.g. credit card purchases from Macys) and summaries (e.g. totals, averages) of transaction data together with facts about elements in the domains of the transactions (e.g. URL and phone number for a given merchant, the fact that two merchants are competitors, product to product category mappings, the fact that two products are complementary).

c) Model(s) Data

This is data relating to the current state of each active TIC model. This includes the current characteristic values, summary data, deltas (i.e. changes), and whatever additional values are required by the model to continue the update process and for model-based selection of content.

d) Metadata

Metadata describes data types, data sources, summary entries, relevance of facts to conjectures, current conjectures, integrity constraints, update frequencies, report formats and the mapping from report data to database schemas. The metadata also includes the history of the viewer's interaction with TIC and policies used by the content selection engine. The system is reflective in the sense that metadata can be queried and reasoned about in the same context as "ordinary" data.

e) Calendar

The Calendar is used by the scheduler to manage model updates and maintenance. All components of the consumer database and models are dynamic. New reports result in additional database entries and over time facts may be forgotten (aged out of the database) leaving only their contributions to summary data. Conjectures change as confirming or refuting evidence is accumulated. New and changed inference rules and metadata are downloaded to the client periodically.

f) Report Interpreter

The report interpreter parses online documents and interprets the entries as new facts. The report format and the mapping from report data to the schemas in the facts database may be self-documenting (i.e. specified within the report itself) or registered by source in a server database and downloaded and stored as metadata. As new facts are entered, triggers associated with consistency constraints are activated to download additional data (e.g. the entering of a transaction referencing an unknown merchant cause information about the merchant to be downloaded from server databases.) Similarly when facts key to a conjecture are downloaded, the Modeling Engine is invoked to update confidence measures and initiate new conjectures.

13

g) Modeling Engine

The Modeling Engine updates consumer models in response to new facts or when queried by the selection engine.

h) Selection Engine

The selection engine chooses what content to present to the viewer when presented with a selectable content option. The choice is controlled by appropriateness, as specified by policies of the media owner and content provider, relevance which is evaluated from models of the viewer based on relevance criteria specified by the content provider, specific constraints for a specific slot specified by the media owner, and overall business policies specified by the media owner and TIC operator. The relevance criterion is represented as a logical expression which is evaluated relative to the viewer model to produce a confidence measure via the same inferring used to evaluate other conjectures. In representation and use, the criterion in effect defines the conjecture: "this content is relevant to the current viewer at the current time."

i) Scheduler

In the preferred configuration, TIC executes as a background service on the client computer. The scheduler is responsible for scheduling system maintenance including downloading reports to which the user has subscribed and regular updates of facts, rules, and policies.

2. TIC Server Side Components

a) Server Side Knowledge Bases

The primary purpose of the server side is to serve as a repository for information required by the client systems. These include:

Report metadata: Information required to parse and interpret documents.

Domain specific fact databases: Information relating to report elements. In interpreting credit card reports, for example, these include merchant and product IDs, contact and classification information for merchants, products, and manufacturers, and relationships between merchants, products and manufacturers.

URL and Software classification databases: These are particularly important for analyzing viewer behavior based on active web pages, windows, and processes.

Rules and policies: The rules and policies used by the Modeling and Selection Engines for updating the user model and measuring and selecting content.

Content Description Databases: Elements of these databases contain references to actual content together with relevance criteria and the metadata required to evaluate appropriateness and consistency with business policies.

Statistical, Accounting, and Administrative databases: These databases track the number of views and other statistics needed for billing and determining overall effectiveness of TIC content selection.

H. Information Used for Selection

1. Aging/Evolution of Profiles and Data; Trend Prediction

A consumer's profile changes over time. Generally these changes are evolutionary and, in some cases, even predictable. Attributes will, in general, change at differing rates and the rate of change will, in general, itself depend on the current profile. Thus, for example, profiles for young people will change more rapidly than profiles of older people. Some changes are predictable. A pregnancy either terminates or results in a newborn; the newborn eventually becomes an infant; the infant becomes a toddler; and so on. In some cases, patterns of change are predictable but the precise timing is not (e.g., at some point almost every adolescent becomes extremely concerned about his or her appearance

14

though the individual age at which this occurs may vary). In these cases, certain specific indicators, e.g. purchase of acne medicine, may be used to discover that a transition has occurred. In general, specific kinds of changes can be recognized by changes in consumer profile, for example a purchase from a maternity store. One way of capturing time dependence which is used by TIC is to compute and maintain profiles over varying periods and track the deltas for these profiles, i.e. the changes in the profiles. Selection criteria and computed attributes can thus be based on behavior over specified periods or on changes in behavior.

2. Selection Data

The information used by TIC for selection has four basic components:

1. Personal information and online behavior;

2. Transaction histories and summaries;

3. Conjectures about the psychographic and demographic attributes of the consumer and predictions of important events which will cause discontinuities and possibly fundamental changes in the consumer profile. A birth, a marriage, a divorce, the purchase of a house, and similar transitions are important in that they result in fundamental changes to the profile and very different behavior during the transition period.

4. Conjectures about the psychographic and demographic attributes of the current viewer.

The first two components contain purely empirical data which is obtained either by direct observation of online actions or by interpretation of reliable reports. The third component is theoretical; it represents a guess about the consumer's characteristic behavior and lifestyle and potential changes based on information in the first two components. The fourth is also conjectural based primarily on online behavior and is used to distinguish the individual viewer from the consumer unit as a whole.

3. Personal Information and Online Behavior

Personal information, such as name and social security number, is extracted and accumulated from online forms filled out by the user or from the interpretation of online statements. The primary use of this personal data is in pre-filling online forms and as a source of demographic information, e.g. age, marital state, number and ages of children.

Online behavior includes information like what software applications reside on the user's machine, what applications are currently active, favorite websites, recency and frequency of visits, and TIC interactions including what content was shown when and what content elicited an online response from the user. Sources of online behavior include interpretation of log and history files maintained by browsers and direct recording of behavior within TIC enabled documents.

4. Transaction Histories and Summaries

Transaction histories are obtained by interpreting online reports. A "report instance" means a document from a specific vendor describing a specific set of transactions, for example, a credit card report for a specific account specifying transactions that occurred over a specific period of time. A "report" means the format of report instances from a given vendor, e.g. a credit card report from Citibank. All report instances of a given report preferably have a common format, i.e. can be parsed by the same parser. (e.g. if a credit card company has multiple credit card report formats depending on the class of credit card then each is considered a distinct report.) A "report type" means a class of reports having a common interpretation, e.g. a credit card report.

With each report type, TIC associates a database schema and summary data. Summary data includes statistics on

15

recency, frequency, and total amounts aggregated over individual products and vendors and over classes of products and vendors. All report instances for a given report type are interpreted into a common schema and summarized. Thus, all credit card reports will be interpreted into the same database schema regardless of source. The schema for a credit card for example would include fields for account, date of sale, amount, merchant identifier, reference number and location.

5 Consumer and Viewer Profiles

The consumer and viewer models are represented as weight vectors over component attributes while the consumer profile depends on all observations and transaction reports. The viewer profile, for the current viewer, is computed only from observations and reports which are known to apply to the current viewer. The extent of viewer specific profile information available depends on the client environment. At a minimum, it includes actions within the current session of TIC. If a URL history report is available, it is interpreted by TIC because it is useful for differentiating between the specific interests of the current viewer and that viewer's interests as a member of the consumer unit.

1 How Content is Targeted and Selected

1. Selection Criteria

Each element of a content description database contains a content specifier and a selection rule. The purpose of the selection rule is to determine whether the content specified will be of interest to a given consumer. A selection rule is represented as a query expression which is evaluated against the TIC consumer database. There are two basic kinds of selection criteria which may be combined using logical connectives (not, and, or) to form a given selection rule.

2. Model Based Tests

An appeal vector together with a threshold parameter defines a model based test. Model based tests may be specified for the consumer unit as a whole or against the individual viewer. The appeal vector is tested against the specified user model. The threshold parameter is used to vary the sensitivity of the test.

3. Direct Database Queries

These are arbitrary database queries against the transaction histories and summaries. For example, "is this consumer already a customer of mine?", "is the consumer a customer of competitor X?", "has the customer spent at least a thousand dollars on consumer electronics products over the past year?".

4. Selection Policies

Selection criteria are associated with and used to determine the suitability of a specific piece of content to a given consumer or viewer. Selection Policies, on the other hand, are associated with potential locations for content. Policies are typically defined by the owners of these locations and are used to restrict the set of candidates considered for that location and to choose which candidate to use in case multiple candidates are suitable. For example, content appearing on an entry for "Circuit City" on a Bank of America credit card statement may be subject to policies defined by Bank of America which owns the page, Circuit City which owns the entry, and general policies of the TIC operator. Selection policies are essentially analogous to selection criteria in the sense that where selection criteria test suitability of a consumer, a selection policy tests suitability of content.

J. An Architecture for an Implementation of TIC on the World Wide Web

1. Overview

As noted earlier TIC is particularly well suited as an application for the World Wide Web. The viewer views

16

content via an Internet browser such as the Communicator from Netscape or the Internet Explorer from Microsoft. In this context, report data is accessed via HTTP and represented as XML annotated text. In reports, the XML tags are used to specify the report type, report source, and report format.

Web Pages with TIC selectable content options are represented as XML annotated HTML text. Special XML tags mark selectable content with selection constraints and display criteria. TIC mediates the display of these pages. TIC can be configured as a plugin, like Shockwave, or as a Java applet. TIC enabled web pages are pre-processed by TIC before being passed to the browser for presentation. XML tags specifying the format and interpretation of interpretable report data are evaluated by TIC and the report data is interpreted. Selectable content tagged data is evaluated to produce an HTML reference via a TIC URL to actual content and that reference is substituted for the selectable content specification. TIC specific tags are stripped and the resulting page passed to the browser for display. The TIC URL substituted for selectable content is reported to the TIC accounting server.

2. Client Side Components

Referring to FIG. 6, there is shown one preferred embodiment of the client side 600 components of TIC assuming Windows NT as the client operating system and Netscape 4.0 as the client browser X, and the server side components. In this embodiment, TIC is written in Java. A similar implementation can be constructed for other client operating systems and network browsers.

a) Secure Client Database

The heart of the client side 600 of TIC is a secure database J. All consumer-specific persistent data of any kind including transaction data, metadata, model data, calendar data, policies, administrative information, the location of TIC servers 604, reside in and are only accessible through the database interface. Access to the database is through Java. Only TIC software has access to the database access routines and the on-disk forms of the data are encrypted with a private key under the control of the client (i.e. consumer computer). FIG. 6 illustrates the client database J as locally resident on the client/consumer computer, which is one preferred embodiment. However, in other embodiment, the client database he physically resident on other devices, and only logically controlled by the consumer computer, so that access to the database still remains fully under the control of the consumer.

In addition to maintaining client-specific data, the client database J behaves as a cache to the TIC server databases 604. Thus all queries, even for generic information such as data about merchants or products, are evaluated first in the client database J. If no information is available locally and there is no flag indicating that global information is unavailable, a remote query for the data is evaluated at a TIC server 604. If no information is returned, a flag indicating that information is unavailable is stored along with a timestamp. If the requested data is available, it is returned to the client and stored in the client database J.

d) System Maintenance Service

In the preferred implementation, the downloading and interpretation of transaction reports and communication with TIC servers for software maintenance and other generic data requests are handled by a system maintenance service L running as a background process. Activities of this service L are driven by events scheduled on the TIC calendar, which is a list of <activity, time> pairs in the client database J, which are used by the scheduler M to initiate the activities

17

at the proper time. Version information and the protocols and information necessary to access consumer transaction reports, along with the event calendar are stored in the client database J. Before carrying out a scheduled activity, the service I queries the client database J to determine whether the system libraries have been updated. If so, the relevant libraries are reloaded.

a) Scheduler

The scheduler M is the software service responsible for triggering maintenance service and report interpretation for subscription reports.

b) Subscription Service

Requests for regular maintenance updates and report downloading are handled through the subscription service K which in turn updates the system events calendar.

TIC Interface and HTML/XML Parser: Access to TIC from the browser X is through an interface H provided by JavaScript and Java Applets. Since TIC requires access to local persistent storage and network access to communicate with TIC databases J, the Java applets run in trusted mode. All sites making use of TIC are certificated.

As described in the overview section, fields for interpretation and illumination are tagged using XML (Extended Markup Language) which is parsed by an XML parser. The first step in the interpretation or illumination of a web document is to parse it into list structures. This is the role of the parser. After this is done, all manipulation of the page is carried out on the list structures.

c) Report Interpreter

The report interpreter I operates on parsed reports. It first pulls out the XML tagged components that identify the report. The interpreter I then queries the client database J for the type and format of the report. The format is represented as an object which includes a method for parsing the list structured form of the report into a stream of logical records. The report type includes a method which interprets each logical record. This method is applied to the stream of records.

f) Page Illuminator

The page illuminator N operates on a parsed page. It generates a list of the illumination forms, i.e. the forms with XML tags specifying TIC illumination. It then passes that list to the selection engine, which is inside Page Illuminator N, to choose the actual content (possibly the empty content) to substitute for each illumination form. The resulting structure is then converted back to text by an HTML Printer and streamed, using JavaScript, to a browser window for display.

4. Server Side Data Servers

The server side components of TIC are essentially passive data providers and are managed by the TIC operator or third-parties.

a) TIC Data Servers

The primary purpose of the TIC data servers 604 are to serve as a repository of software and domain specific data related to the subject matter of reports, such as product descriptions and vendor contact information. These are represented as standard relational databases with standard web-based interfaces used to populate, query, and modify them. Specifically, there are four types of servers managed by the TIC operator.

1) Accounting Server

The function of the accounting server A is to track the use of illuminations for billing purposes. The accounting server A is updated as conditional illuminations are selected by the targeted URL server D for presentation to the client 600 and again when the chosen illumination is selected by the client 600.

18

2) Domain Knowledge Server

The domain knowledge server B contains domain specific data related to report elements. In a credit card context, for example, this data provides information about merchants including address, phone numbers, URLs.

3) Metadata Server

The metadata server C provides software, policies, report format, and other forms of non-domain specific data required by TIC to interpret and illuminate documents.

4) Targeted URL Server

The targeted URL server D presents selectable content options to the page illuminator N. These options consist of queries with associated content tokens. The queries are evaluated against the client database J to determine the most appropriate content tokens. When the page illuminator N has selected among the options, the content tokens are converted to URLs and the accounting server A is updated.

5. Third Party Servers

A third party server 602 can be any website which provides documents or data used by TIC for interpretation and illumination. Conceptually, there are three kinds of servers. However, a given website may act as one or all of these types. In fact, a given document may be both interpretable (i.e. have a report format which is parsed into data fields for updating the secure client database) and illuminable (i.e. have embedded TIC-tags which are replaced during the illumination process).

1) Report Server

A report server E is a source of the interpretable reports used by TIC to populate the secure client database J used in the illumination process.

2) Illuminable Document Server

An illuminable document server F provides illuminable documents, which are web content enabled for TIC illumination. These documents include a Java preamble which invokes the TIC client side processing and TIC tags for illuminable elements.

3) Illuminations Server

Since illuminations are implemented as URLs, any website can be a server G for illuminations for illuminated pages. The page illuminator N simply substitutes the appropriate HTML text. The Internet browser X then embeds the content automatically in the displayed document.

K. Exemplary Interpretation and Illumination Processes

Referring again to FIG. 6, there is shown various illumination and illumination processes using the above described architecture. In these processes, data flow occurs over either the Secure Sockets Layer or standard HTTP.

Data/Process Flow Action

1. Scenario 1: Client Views TIC Enabled Report

1 The report server E sends a TIC tagged report in response to a client request.

2 The TIC client service 600 interprets the report and sends a request to TIC servers 604 for domain knowledge, metadata and a list of content selection queries. TIC client service 600 also updates TIC secure client database J with relevant information.

3 TIC client service 600 evaluates the list of queries against the consumer model in the client database J to select the most relevant selection and requests the targeted URL server D to send the URL associated with the selection. The targeted URL server D also logs the selection with the accounting server A for accounting and billing purposes.

6 TIC client service 600 gives control back to browser X which displays the page by resolving the URLs passed by the TIC client service 600. The content for these URLs are resolved from illumination servers G.

2. Scenario 2: Client Views TIC Enabled Home Page
- 4 An illuminable document server F sends a TIC tagged home page in response to a client request.
- 2 TIC client service 600 interprets the page and requests TIC servers 604 for metadata and a list of content selection queries.
- 3 TIC client service 600 evaluates the list of queries against the consumer model to select the most relevant selection and requests the targeted URL server D to send the URL associated with the selection. The targeted URL server D also logs the selection with the accounting server A for accounting and billing purposes.
- 6 TIC client service 600 gives control back to browser X which displays the page by resolving the URLs placed by the TIC client service 600. The content for these URLs are resolved from illumination servers G.
3. Scenario 3: Client Views TIC Enabled Forms
- 4 An illuminable document server F sends a TIC tagged form requesting fields to be pre-filled from the secure client database J. Upon client 600 sending form back to server F, TIC client services 600 interprets the form and updates the secure client database J with field additions and changes.
4. Scenario 4: TIC Secure Client Service Requests Scheduled Report
- 5 Report server E sends a TIC tagged report in response to a scheduled request from the scheduler M of the client 600.
- 2 TIC client service 600 interprets the report and requests TIC servers 604 for domain knowledge and metadata. TIC client service 600 updates TIC secure client database J with relevant information.
- L. Client-side Procedures

Within the browser, TIC is activated by JavaScript preambles in pages loaded from TIC enabled web sites. FIG. 7 illustrates the client side processes that occur when illuminating and interpreting TIC enabled documents.

1. Installation

A TIC enabled web page initially arrives 702 at a client computer. Browser pages from TIC enabled sites contain a JavaScript preamble which tests 704 the client environment to determine whether TIC components have been installed on the client and is up to date. If TIC has not been installed, the client is offered the option of downloading and installing TIC. The installation procedure 706 installs Java libraries, initializes the TIC database, and creates, enables, and starts the TIC background service process. If TIC is installed but not up to date, new libraries are installed, an update applet run, and the version information in the database updated.

Models are represented as subclasses of the abstract class Model. In addition to having the attributes and methods described earlier, objects of class Model have an installation method which creates the database schema for the model including storage for characteristic values and summary data with associated triggers. The installation method also registers the Model in the database so that it can be used. Installation of a model involves downloading the class definition for the model and running the install method for the model.

2. Invoking TIC from the Browser to Process a Page

After any necessary TIC installation has been completed, the JavaScript preamble in a TIC enabled page determines 710 whether TIC processing has been disabled on the client. (Disabling of TIC would typically be done at the request of the viewer.) If so, then the page is passed 708 through to the

browser without any TIC processing. Otherwise, the page is passed to a top-level routine which parses the page and determines 712 whether there is any interpretable or illuminable content. If there is interpretable content, it determines 714 whether the report has already been interpreted. If not, then depending on policy 716 it may schedule it to be interpreted later by the interpreter process or have it interpreted 718 immediately. If it has illuminable content 726, the illuminator is invoked 728; otherwise the page is just passed 730 through to the browser for display.

For regular reports with interpretable data, at the discretion of the vendor, a JavaScript may be run which offers the viewer the option of subscribing to the report, i.e., arranging to have the TIC service process automatically download and interpret the report at specified intervals and times.

3. Interpreting a Report Record

The task of interpreting a report record is handled by a method of the report type. Every report type has an associated schema which includes a table or tables for the transaction history with triggers for updating summary data and preserving referential integrity. The interpretation method first inserts the record data into the table or tables which automatically causes summary data to be updated and additional data to be downloaded as necessary to preserve references. It then cycles through the list of registered models applying the update methods to the transaction.

4. Selecting Content

The role of the selection engine is to determine which illuminable elements on a page to illuminate and for those choices what content to use in the illumination. In general, policies will constrain the number and types of illuminations on a page. These policies are defined by parameters which constrain the density and total number of illuminations and by rules in the form of queries to be executed against content databases (see below) which constrain the candidate sets for a given page and a given illuminable element within the page. Policies may be associated with the type of the page, the owner of the page, and the owner of a given illuminable element within the page. In addition, a specific page may contain explicit policy constraints expressed using XML. Policies may also specify strategies and heuristics to use in finding and choosing a satisfying set of illuminations and choosing a particular illumination for a given element. For given a illuminable element, factors influencing the choice might include the appeal of the content based on one or several active consumer models, frequency constraints or requirements for a given choice of content, vendor preferences of TIC, the owner of the page, and the owner of a given element. Like constraints on content, the policies regarding choice strategies can be specified implicitly by type and owner and expressed explicitly within the page using XML.

M. Hierarchical Models

Referring now to FIG. 8, there is shown one embodiment of a system in accordance with the present invention. The system 800 includes:

A computing device 802 with local memory, computing capability, persistent storage, a display, and a network connection (e.g. a personal computer with a modem connected to an Internet Service Provider or an intelligent television set-top box connected to a cable head-end). The computing device 802 has access to a database 804 (logically part of the computing device, but it could be resident outside of the device, such as on a remote server computer maintained at a web site), which contains facts extracted from the process of interpretation 806 of a structured document. These facts are used to build an attribute vector 808 through the use of

a mapping subsystem **810**. Each new fact entered into the database **804** is presented to the mapping subsystem **810**, which uses knowledge obtained from a metadata server (FIG. 7) to update numeric fields of the attribute vector. The metadata is cached in the local database **804** and so is available to mapping subsystem **810**.

Elements of the attribute vector **810** express such consumer attributes, interests, preferences, or demographics. The data elements are preferably scaled values, though actual values, Boolean, or qualitative values may be used. For example, scaled values may be used for attributes are both numerical, such as relative income (e.g. on a scale of 0 to 1, where 0 is very poor and 1 is very rich), or qualitative, such as "interest in tennis" (e.g. 0 is none, 1 is very tennis-centric). The selection of which attributes to encode in the attribute vector is within the discretion of the system designer and may reflect any useful categorization or attributes of consumer interests, preferences, demographics, or the like.

The elements of the attribute vector **810** can be accessed directly, or can be aggregated and abstracted in a variety of ways, which will be described in detail shortly. A useful abstraction is the Boolean Abstraction **812**, which examines elements of the attribute vector **810** and creates logical expressions from them. For example, if the attribute vector for consumer C contains an element x_i which represents degree of confidence that consumer C is pregnant, then the Boolean Abstraction may contain a rule that maps the query $\text{pregnant?}(C)$ (which returns TRUE or FALSE) to the threshold inequality: $x_i > 0.75$, which can be checked in the model's attribute vector **808** for a specific consumer.

The goal of creating the attribute vector is to allow illumination candidates to be evaluated and ranked according to their relevance to the consumer. An illumination consists of content, plus a query that may be Boolean or may be a function of elements of the attribute vector. A set of unsorted illuminations **814** is presented to the system **802**, and forms a group of selectable content alternatives that may be used to illuminate portions of the document. The unsorted illuminations **814** are received in association with a structured document or portions thereof, electronically delivered to the consumer's computer **802**. The unsorted illuminations **814** may be received from one or more content providers, even for a single document. For example, if the structured document is a credit card statement, the merchant identified in each statement line may be responsible for transmitting a number of illuminations to be applied only to its one line. Each content provider will generally have only a limited display area in which to present the illuminations when the document is displayed on a display device.

The Illumination Sorter **816** then uses data from three data sources (the database **804** directly, the attribute vector **808**, and the Boolean Abstraction **812**) to do two things. First, it selects a set of illuminations that match either facts about the consumer in the database **804** or the consumer's attribute vector **808** well enough. Second, the Illumination Sorter **816** sorts the selected illuminations in an order determined via a match score computed from the three data sources. The sorted illuminations **818** are then presented to an Illumination Display subsystem **820** for presentation to the consumer.

N. The Attribute Vector

The present invention includes a novel method for storing and using information about individual consumers as derived from the transactional behavior of the consumer. The act of interpretation results in a number of facts stored in a database. These facts can be very specific, for example,

that a consumer spent \$136.78 at Hertz Car Rental in Sacramento on Jan. 4, 1999. In some cases, an advertiser (such as a competing car company) might want to target individuals who rented from Hertz. Such a query is easy to do in a standard database, for example, one that uses SQL commands.

However, in other cases, an advertiser may wish to target individuals who rent cars relatively frequently. In this case, it would be beneficial to have an element of a model's attribute vector represent a propensity to rent cars. Such an element should have the ability to aggregate car rental data across a number of different transactions. It should also be possible to allow the strength of the attribute to "decay" over time, so that if a consumer does not rent a car for some period of time, this attribute becomes less pronounced.

1. Hierarchical Models Using Attribute Vectors

FIG. 9 depicts an attribute vector **808**, comprising a set of hierarchical vectors **902**, **904**, and **906**. A base level vector **902** shows the vector quantity x comprising a number of base level attributes, having scalar values $x_1, x_2, x_3, \dots, x_n$. Each scalar value can represent a different consumer attribute. For example, x_1 may denote an interest in football, x_2 an interest in baseball, x_3 an interest in volleyball, etc. Obviously, depending on the level of granularity in the description, there may be a large number of scalars. These may be grouped into abstract collections, each represented by an aggregated attribute value. For example, consider hierarchical vector **904**, a vector quantity comprising scalars $a_1, a_2, a_3, \dots, a_m$. Each aggregated attribute in this vector **904** is associated with a selected plurality of base level attributes. Here, the scalar a_1 is an aggregated attribute that may represent an interest in sports. This value is an abstraction of data in vector **902**. In one embodiment, a_1 is an appropriately weighted and normalized sum of the elements x_1 through x_n of vector **902**; similarly, a_2 is a weighted and normalized sum of x_2 through x_n , and represents an abstraction of the attributes that these scalars x_2, \dots, x_n represent. Element a_3 is the same as element x_{10} of vector **902**.

This abstraction process may be repeated as needed at further levels of abstraction, wherein one hierarchical vector is used as the base level vector for another hierarchical vector. For example vector **906** has an aggregated attribute b_1 which is associated with a selected set of vector **904**'s aggregate attributes a_1 and a_2 , and has value which derived from the values of the aggregate attributes. In this way, hierarchical representations of consumer interests may be built. A general "sports interest" aggregated attribute in one vector may be derived from lower level attributes for football, baseball, basketball, tennis, volleyball, etc. A general "culinary interest" may likewise derived from "cooking" and "restaurant going" attributes, the latter being further derived from specific restaurant type attribute, such as Chinese, Thai, Italian, etc.

Boolean abstractions of the data are also possible. For example, one example of a function in the Boolean Abstraction **812** computes the threshold function $[(x_2 > 0.4) \& (x_3 > 0.7)]$ where x_2 and x_3 are taken from the appropriate vector and elements (basic or aggregated) of an attribute vector **808**. If x_2 indicates an interest in football and x_3 an interest in San Francisco, then the threshold function might represent the Boolean query "49ers-fan?(C)" for consumer C, thereby allowing a content provider to craft a Boolean query for San Francisco 49ers-related targeting of their conditional content. Similarly, threshold tests can be created for frequent-car-renter? and pregnant?, and so forth. These functions are merely exemplary; the present invention

allows any type of Boolean function on the elements of an attribute vector to be implemented and passed dynamically to the Boolean Abstraction **812** for execution.

2. Illumination Selection Process

FIG. 10 depicts the process flow for matching an illumination against an attribute vector and data in the database **804**. As previously mentioned, the database **804** contains facts derived from the consumer's transactions, plus relevant metadata cached after retrieval from the metadata server. The mapping subsystem **810** has updated the fields of the attribute vector **808**, and the Boolean Abstraction **812** provides additional Boolean functions that may be used in matching vectors associated with received conditional content against the consumer's attribute vector **808**.

The Illumination Sorter **816** selects and sorts a set of illuminations by measuring each against the data sources **804**, **808**, and **812**, using the matching subsystem **1018** to compute a match score **1020** for each illumination. Illuminations whose match score is above a threshold associated with each illumination are selected; the selected illuminations are ordered by their match score to form the sorted illumination list.

It should be noted that all of the foregoing testing of illuminations and generation of match scores occurs entirely under the control of the consumer's computer, and thus without the providers of the illuminations having any access to the highly sensitive and private information about the consumer that is contained in the database **804**.

In order to describe the illumination matching process in more detail, it is useful to describe the components of an illumination. An illumination **1030** comprises three main components: The content **1032**, which will be used if the illumination is selected for display; the Boolean query **1034**, which provides for matching against either facts in the database **804** or abstracted data from Boolean abstraction **812**; and, model data **1036**, further comprising a target vector **1038** and a relevancy vector **1040**.

The content **1030** may be any type of displayable content, including text, hypermedia, images, animations, audio, video, and the like.

Accordingly, the Illumination Sorter **816** includes a Boolean Matching **1016** and Metric Matching **1018**. The Boolean Matching **1016** evaluates the Boolean query **1034** used to select all illuminations that do meet the query constraints with respect to the facts in the database **804** or abstracted data from the attribute vector **808** via the Boolean Abstraction **812**.

Thus, all illuminations for which the Boolean query evaluates to TRUE are selected from the set of illuminations. The meaning of this result is that such illuminations do match facts or data descriptive of the transactions, interests, preferences, or demographics of the consumer whose computer will potentially be selected for display.

Each Boolean query may also be given a "priority," which is used to sort a set of illuminations that only use Boolean queries, and do not use model queries. The priority is generally assigned by the content provider providing the illuminations. Those illuminations with higher priorities will appear earlier in the sorted illumination list. If no data from the attribute vector is used in the matching process, the priority assigned to the query is the match score produced by the matching subsystem.

While Boolean querying alone may be used to select and sort illuminations, it is preferable to employ model data of the consumer model for more fine-grained targeting of illuminations. This is achieved through associating a target vector **1038** with each illumination. This target vector **1038**

is then compared by the Metric Matching **1018** to generate a match score, as a function of the distance (in multidimensional attribute space) between the attribute vector **808** of the consumer and the target vector **1038** of an illumination.

In one embodiment, the match score is the metric distance between the two vectors; in other embodiments it may be a combination of the measure of the angle between the vectors (as measured from the origin of the multidimensional space) and the measure of the length of the two vectors.

The attribute vector **808** and target vectors **1038** used by the Metric Matching **1018** may be the full vector of attributes (e.g. vector **902** in FIG. 9) or any abstraction of the full vector (e.g., vectors **904** or **906**). However, a content provider may be interested in comparing only a selected number of the components of the target vector **1038** with the attribute vector **808** of a consumer. Accordingly, in one embodiment the illumination also contains a relevancy vector **1040**, to indicate which elements of the target vector **1038** are important. If an element of the relevancy vector **1040** is set to zero, the attribute represented by the element is of no interest in the matching; if set to 1, it is completely of interest. A relevancy vector value may vary between 0 and 1, indicating that the attribute is of any arbitrary level of interest.

The final match score is computed by the Metric Matching **1018** as a combination (e.g. weighted sum or product) of the priority resulting from the Boolean query, and the distance metric from the target vector **1038** to the consumer's attribute vector **808**.

With appropriate normalization, the distance metric chosen will have a match score of 1 if the match is perfect, and will asymptotically reach zero as the match becomes poor. Thus, the model score and the Boolean query with priority can be reconciled and sorted in a manner that yields useful results.

3. Updating a Consumer Model

This section describes one embodiment for updating the component elements of the attribute vector **808** in a consumer model. Updating is managed by the mapping subsystem **810**.

Each element in the attribute vector **808** represents a consumer preference, interest, psychographic, demographic aspect, or alternatively, the probability the consumer is interested in a specific topic, category, and the like. These attributes are updated as a function of a measure of relevancy of a transaction to each attribute.

A number of different measures of relevancy may be used to update the attribute vector. In one embodiment, the measure of relevancy of a transaction is the conditional probability of the transaction occurring given the consumer's preference, as expressed in a selected attribute. Updating here may be done using Bayesian analysis.

Let $P(x|d)$ denote the probability of x given data d (for example, that a specific event occurred). Let $P(d|x)$ denote the probability of the data (the event occurring), knowing the prior probability x . Let $-x$ denote the negative of x . And let $P(d)$ be the a priori probability of data.

Bayes' Theorem states that:

$$P(x|d) = P(d|x)P(x)/P(d)$$

But in the case where $P(d) = P(d|x)P(x) + P(d|-x)(1-P(x))$, i.e., the probability of the data is the conditional probability under the case for x or $-x$, we get:

$$P(x|d) = P(d|x)P(x)/[P(d|x)P(x) + P(d|-x)(1-P(x))]$$

An example using real-world extensions to the variables will make it easy to understand. The probability values are

shown in table 1102 of FIG. 11. Consider a case where x indicates an interest in cooking, and the data of interest is a transaction that occurs at Williams-Sonoma, a cooking-oriented store. Then:

$P(x)$ ="Degree of (or probability of) interest in cooking"

A priori value=0.001

Shown as the top-most value in column 1110 in table 1102 of FIG. 11

$\neg x$ =not x ="Non-interest in cooking"

$P(\neg x)=1-P(x)$ ="Degree of (or probability of) non-interest in cooking"

Computed value=0.999

d ="A transaction at Williams-Sonoma occurs"

This event triggers the application of Bayesian analysis by the mapping subsystem 810

$P(d|x)$ ="Probability of a transaction at Williams-Sonoma occurring given an interest in cooking"
Assigned a value of 0.1 based on statistical regression of existing data

Shown in column 1104 in table 1102 of FIG. 11

$P(d|\neg x)$ ="Probability of a transaction at Williams-Sonoma occurring given there is a non-interest in cooking"

Assigned a value of 0.02 based on statistical regression of existing data

Shown in column 1106 in table 1102 of FIG. 11

$P(x|d)$ ="Degree of (or probability of) being interested in cooking given a transaction at Williams-Sonoma occurs"

Value is to be calculated and used as new value of $P(x)$
Values are updated in successive rows of column 1110 in table 1102 of FIG. 11

The following code fragments (written in the Java programming language) illustrate one embodiment for Bayesian updating by the mapping subsystem 810. Each attribute in an attribute vector is an instance of class Attribute. This class is defined below, as is the update function for the Attribute:

```
public class Attribute {
    // an attribute has a value. It
    // also has a name by which it can be referenced.
    private double value;
    private String name;
    public boolean update(Transaction txn) {
        // update the value of the attribute according to
        // the Bayesian method. Return true if the value was updated,
        // or false if the value is not updated.
        // First fetch P(d | x) and P(d | ¬x) from the database (804)
        // using the fetch method of the Transaction object. This will
        // go out over the net to get the metadata from a metadata
server
        // if it is not cached
        double pdx, pdxn;
        try {
            pdx = txn.fetch("pdx", self);
            pdxn = txn.fetch("pdxn", self);
            // If there is no probability data, the transaction is
            // not relevant to this attribute and no updating is done
            } catch (NoProbabilityDataException e) {return false;}
            // otherwise apply Bayes' updating
            value = (pdx * value) / (pdx * value + pdxn * (1 - value));
            return true;
        }
    }
}
```

The Attribute Vector class contains an array of Attributes. This code fragment illustrates one example of how the attribute vector is updated for all transactions in a report:

```
public class AttributeVector {
    // an array of attributes
    private Attribute attributeArray[];
    public void update(AttributeVector (Report report) {
        // the function txnList returns all transactions on the report
        List txnList = report.txnList();
        List txns;
        Attribute att;
        // here we loop over each element in the attribute vector
        for (int i=0; i<attributeArray.length; i++) {
            att = attributeArray[i];
            // now, for each txn in the list, we attempt to update.
            while (txns) {
                Transaction txn = (Transaction) head(txns);
                txns = tail(txns);
                att.update(txn);
            }
        }
    }
}
```

FIGS. 11a and 11b shows the result of an example Bayesian update by the mapping subsystem 810, with the conditional probabilities being used to build up confidence in an attribute. In FIG 11a, table 1102, there is shown an initial value for $P(x)$ to be 0.001 (as indicated in the row specified by transaction number 0 in column 1108), indicating no significant interest in cooking. After four transactions, the value of $P(x)$ in column 1110 rises to 0.385, indicating moderate interest. After eight transactions, $P(x)$ has gone to 0.997, indicating a very strong preference for cooking-related activities.

The ratio of $P(d|x)$ to $P(d|\neg x)$, as shown in columns 1104 and 1106, determines the speed with which the certainty of interest increases with each transaction that occurs.

FIG. 11b illustrates a second example in the table 1112 involves car rental, where the ratio of $P(d|x)$ to $P(d|\neg x)$, in columns 1114 and 1116, is larger, and the convergence on virtual certainty of interest— $P(x)$ in column 1120—is faster.

The speed with which the certainty of interest changes may be characterized as the velocity of interest. High velocities of interest for any particular preference, attribute, and the like may be used to infer changes in a consumer's interest, and to further infer changes in facts or circumstances about the consumer, such as getting married, having a child, purchasing a car, a home, and the like.

While Bayesian updating allows new information to enter the system, there is no sense of time in the equation. Time is important because transactions that occurred long in the past should have less relevance in determining today's preferences. Thus, the present invention introduces a notion of "decay" in the life of the transaction data, which reduces the influence that older transaction have on the attribute vector 808.

Decay of the influence of older transactions on the attribute vector 808 may be achieved by updating the attribute vector 808 using the conditional probabilities of no transaction occurring during a given period of time. This has the effect of introducing a "non transaction" that occurs when other transactions do not, and updating the attribute vector 808 accordingly.

FIGS. 12a and 12b illustrates this technique. All probability values are the same as in FIGS. 11a and 11b, respectively, except for the introduction of two new quantities:

$P(n|x)$ ="Probability of no cooking-related transactions occurring given an interest in cooking"

Assigned a value of 0.9 based on statistical regression of existing data

Shown in column **1204** in table **1202** of FIG. **12a**
 $P(n-x)$ ="Probability of no cooking-related transactions
 occurring given there is a non-interest in cooking"
 Assigned a value of 0.98 based on statistical regression
 of existing data

Shown in column **1206** in table **1202** of FIG. **12a**
 Looking at the table **1202** of FIG. **12a**, there is shown a
 Williams-Sonoma transaction in period **1** and another in
 period **2**, where the periods are shown in column **1212**.
 These two transactions yield the same values of $P(x)$ —
 shown in column **1214**—as in the non-decay example of
 FIG. **11a**, namely 0.005 for period **1** and 0.024 for period **2**.
 However, in period **3**, there is no Williams-Sonoma
 transaction, and no other cooking-related transaction. Hence
 the non-transaction—involving $P(n|x)$ and $P(n-x)$, shown in
 columns **1204** and **1206** respectively—is employed, and the
 attribute vector **808** is updated during this period with the
 appropriate probabilities for the non-transaction. This non-
 transaction has the effect of reducing the probability esti-
 mation for interest in cooking.

Interest again rises with another Williams-Sonoma transac-
 tion in period **4**, and again in period **5**. But periods **6** and
7 lead to a decline in the probability of interest in cooking,
 and period **8** (with a Williams-Sonoma transaction) again
 leads to an increase.

The code fragment relevant to updating the entire
 Attribute Vector based on the use of Bayesian updates,
 including the use of the "non transaction" for implementing
 decay is as follows. Note that the method update At Vector
 has been altered to accept as arguments a Period as well as
 the Report:

```

public class AttributeVector {
    // an array of attributes
    private Attribute attributeArray [];
    public void updateAtVector (Report report, Period period) {
        // the method txnList returns all transactions on the report
        // that occur within the specified period
        List txnList = report.txnList(period);
        List txn;
        Attribute att;
        boolean updateApplied;
        for (int i=0; i < attributeArray.length; i++) {
            att = attributeArray[i];
            // now, for each txn in the list, we attempt to update.
            // If we do update, we note
            // that a transaction update has been applied
            updateApplied = false;
            while (txn) {
                Transaction tx = (Transaction) txnList.get(i);
                tx = txnList.get(i);
                // update and change updateApplied to true if here
                // really was an update.
                updateApplied = att.update(tx) || updateApplied;
            }
            // if no updates were done, then we apply the
            // non-transaction to decay the probability value
            if (!updateApplied) {
                att.nonTransaction ();
            }
        }
    }
}

```

The class Attribute also has a new method to apply the
 non-transaction. This is shown in the revised code fragment
 below:

```

public class Attribute {
    // an attribute has a value. It
    // also has a name by which it can be referenced.
    private double value;
    private String name;
    public boolean update (Transaction txn) {
        // update the value of the attribute according to
        // the Bayesian method. Return true if the value was updated.
        // or false if the value is not updated.
        // First fetch P(d | x) and P(d | ~x) from the database (804)
        // using the fetch method of the Transaction object. This will
        // go out over the net to get the metadata from a metadata
        server {
            // If it is not cached
            double pdx, pdnx;
            try {
                pdx = txn.fetch("pdx", self);
                pdnx = txn.fetch("pdnx", self);
                // If there is no probability data, the transaction is
                // not relevant to this attribute and no updating is done
                // catch (NoProbabilityDataException e) { return false; }
                // otherwise apply Bayes' updating
                value = (pdx * value) / (pdx * value + pdnx * (1 - value));
                return true;
            }
        }
        public void nonTransaction () {
            // update the value of the attribute according to
            // the Bayesian method, using the non-transaction metadata
            // This will go out over the net to get the metadata from a
            // metadata server if it is not cached
            // fetch index "pnrx" is the probability of a non-transaction
            // given x;
            // "pnrx" is the probability of a non-transaction given not x
            double pnrx, pnrxn;
            try {
                pnrx = att.fetch("pnrx", self);
                pnrxn = att.fetch("pnrxn", self);
                // If there is no probability data, the transaction is
                // not relevant to this attribute and no updating is done
                // catch (NoProbabilityDataException e) { return; }
                // otherwise apply Bayes' updating
                value = (pnrx * value) / (pnrx * value + pnrxn * (1 - value));
            }
        }
    }
}

```

The table **1220** in FIG. **12b** shows that again, the ratio of
 the value of $P(n|x)$ to $P(n-x)$ —columns **1222** and **1224**—
 controls the rate at which confidence decays. These values
 are determined from statistical regression on existing data
 sets.

The values of $P(d|x)$ and $P(d|\sim x)$ are metadata associated
 with each combination of attribute of the attribute vector **808**
 and transaction owner, and the values of $P(n|x)$ and $P(n\sim x)$
 are metadata associated with each element of the attribute
 vector **808**, and potentially with specific groups of transac-
 tion owners. A transaction owner is an entity with which the
 transaction is associated in the database **804**, such as a
 merchant for a financial transaction, or a web site for a URL
 history list. The a priori probability values may be deter-
 mined by statistical analysis of large amounts of blinded
 data, but are then used to refine specific consumer models.

In these examples, the value of $P(d|x)$ and $P(d|\sim x)$ are not
 shown as having any dependency on the dollar value of the
 transaction. This need not be the case. The probabilities can
 be arbitrary functions of the transaction, including the owner
 of the transaction, the amount of the transaction, and other
 transaction data.

When the aggregated attributes from the attribute vector
808 are involved, the aggregated value is a weighted and
 normalized sum of a number of attribute values. FIGS. **13a**
 and **13b** depicts tables showing conditional probability
 metadata for the following transactions:

$P(s|x)$ ="Probability of a transaction at Sportmart occur-
 ring given an interest in sports"

Assigned a value of 0.1 based on statistical regression of existing data

Shown as column **1306** in table **1302** of FIG. **13a**

$P(s-x)$ ="Probability of a transaction at Sportsmart occurring given there is a non-interest in sports"

Assigned a value of 0.02 based on statistical regression of existing data

Shown as column **1308** in table **1302** of FIG. **13a**

$P(v|x)$ ="Probability of a transaction at VolleyBallWorld occurring given an interest in volleyball"

Assigned a value of 0.25 based on statistical regression of existing data

Shown as column **1310** in table **1302** of FIG. **13a**

$P(n-x)$ ="Probability of a transaction at VolleyBallWorld occurring given there is a non-interest in volleyball"

Assigned a value of 0.01 based on statistical regression of existing data

Shown as column **1312** in table **1302** of FIG. **13a**

$P(n|x)$ ="Probability of no sports-related transactions occurring given an interest in sports"

Assigned a value of 0.9 based on statistical regression of existing data

Shown as column **1314** in table **1302** of FIG. **13a**

$P(n-x)$ ="Probability of no sports-related transactions occurring given there is a non-interest in sports"

Assigned a value of 0.98 based on statistical regression of existing data

Shown as column **1316** in table **1302** of FIG. **13a**

Table **1302** shows the result of three periods of transaction activity. The initial probabilities of interests in the various sports (shown in column **1304**) are all set to 0.10 in column **1318**. The next column, **1320**, shows the values of all the probabilities after a transaction at Sportsmart, which can not be attributed to any specific sport, and so has a moderate effect on all variables x_1 through x_5 . The last value in column **1320** is the value for x_6 , the indicator of general interest in sports; it is simply the average of the values of x_1 through x_5 .

Column **1322** shows how all those probabilities decrease in period 2, where no sports-related transaction occurs. Then, in period 3, a transaction occurs at VolleyBallWorld. This is shown in column **1324**. Note that non-volleyball sports have had their probabilities reduced, while the volleyball preference increased. The value of x also increased significantly.

In FIG. **13b**, table **1332** shows the result of three periods of transaction activity involving the same set of transactions in a different order. Again, the initial probabilities of interests in the various sports (shown in column **1334**) are all set to 0.10 in column **1348**. The next column, **1350**, shows the values of all the probabilities after a transaction at VolleyBallMart, which causes the value of x_4 to increase to 0.202 while all other values in column **1350** decrease slightly to 0.009. Again, the last value in column **1350** is the value for x_6 , the indicator of general interest in sports; it is the average of the values of x_1 through x_5 .

Column **1352** shows how all probabilities decrease in period 2, where no sports-related transaction occurs. Then, in period 3, a transaction occurs at Sportsmart. This is shown in column **1354**. Note that all sports have had their probabilities increased, and value of x also has increased significantly.

The weighted sum x tracks the general interest in sports, and can be used as an aggregate attribute in the attribute vector for content providers who wish to target information to consumers interested in sports in general, without regard

to specific sports. Items such as sports nutrition products and general conditioning information would fall into such a category.

Content providers who wished to target a specific sport could match their illuminations against the more specific sport subcategories. This would be of interest to a merchant advertising a tennis magazine, for example.

While a preferred embodiment uses Bayesian updating methods, updating of attribute vectors may be done with any variety of techniques, including exponential decay, wavelets, Gaussian combination, and the like.

Once the concept of time dependence is incorporated into the attribute vector **808** as described above, it is apparent that the Boolean Abstractor **812** is a very powerful tool for directing targeted content to appropriate consumers. Queries on a conventional database (for example, using the SQL language) cannot easily capture a consumer's interest in a particular area, unless there is a very explicit mapping between specific interests and specific transactions. But in practice, it is impossible to provide sufficient mappings between the transactions of a consumer and all of the possible interests and attributes that such transactions may evidence.

In the present invention however, a particular value of an attribute in the attribute vector **808** may be derived from any number of transactions of very different types that occur over time or behaviors of the consumer. The present value of the specific attribute depends not only on these interrelated transactions, but also on their time dependence.

Interest in golf, for example, may be indicated, by transactions at a golfing-oriented sports store, a vacation purchased from a golf-related vacations company, subscriptions to golf magazines, visiting golf-related Web sites, as well as by purchases at more general sporting goods stores and travel to cities which have famous golf courses. It would be nearly impossible for a content provider to craft a query golf-interest? that could examine all transactions in a conventional database and determine the complex combination of supporting or detracting evidence that has accumulated over time from a series of purchases. Yet in the present invention, a single "golf interest" attribute in the attribute vector **808** may be defined, and updated from an arbitrarily complex sequence of transactions and consumer actions, thereby capturing in a single attribute the level of the consumer's interest in golf. Accordingly, it then becomes a simple matter to construct a Boolean query that determines the value of the golf-interest attribute to see if its value exceeds a threshold.

Combinations of thresholds, such as interest in San Francisco and interest in football, provide even more useful targeting via the Boolean Abstractor **812**. Such custom queries can be written simply and easily by a content provider using the Boolean Abstractor; they would be nearly impossible to write in SQL since the content provider would not have any way of determining all of the possible transactions and consumer behaviors that might evidence an interest in a specific area.

O. Example Applications of Hierarchical Attribute Vectors

1. Content Rotator

FIG. **14** depicts one embodiment of a method for displaying targeted content according to the results of sorting a group of illumination candidates. The figure depicts a portion of credit card statement **1402** from MultiBank that is delivered electronically to a consumer's computer via a network, such as the Internet, and viewed on the consumer's computer.

31

The credit card statement contains a number of statement lines, each including a date, a merchant identifier, advertising space, and an amount. The advertising space is controllable by the merchant to provide an ordered sequence of illuminations, as determined by the Illumination Sorter **816**.

For example, in statement line **1404**, the merchant **1406** is barnesandnoble.com. The merchant has some advertising space available, which contains content **1408** (here an advertisement) for "Top 20 list of best selling books for your child". This content is from an ordered set of illuminations, which have been included in, or are accessible from, the data that is used to construct the credit card statement. This particular content was deemed to be the most appropriate for this consumer, as a result of the illumination sorting process. However, there are other applicable content of this merchant that were also selected by the illumination process, that is having target vectors or Boolean queries that matched attributes or facts of the consumer. However, given the limited space on the credit card statement that is allocated to each merchant, there is insufficient space for concurrently displaying all of the content. This problem of how to display multiple illuminations is solved by using the content rotator **1410**, as indicated by the "star" graphic. Other graphical indicia may also be used, such as icon buttons, hyperlinks, changing cursor icons, and the like.

When the consumer clicks on the content rotator **1410**, a new content item may appear; this is shown in FIG. **15**, where content **1508** has now appeared. Additional clicks on the content rotator **1410** will cycle through the selected illuminations for this statement line **1414**. Various presentation orders may be used to determine the sequence in which the illuminations appear. In one embodiment, the content items are presented in random order. Another embodiment recognizes the value of screen real estate and thereby presents the content items in the order most likely to interest the consumer; i.e., in the order as specified by the Illumination Sorter **816**. Other presentation orders may also be used.

The content rotator **1410** is also useful in implementing the illumination policies of the statement provider, while still allowing the consumer to receive offers of value via the content items. For example, in FIG. **14**, line **1412** of the consumer's statement has a blank area **1414** where a content item from the illumination process could have been placed. This content item may not have been shown because MultiBank, as owner of the credit card statement, may have wanted to keep a large fraction of the statement lines unilluminated. Accordingly, MultiBank defined a policy to effect this requirement, for example by allowing only less than a certain percentage of statement lines to be illuminated, or allowing a selected list of merchants to illuminate their statement lines. But the content rotator **1416** on this line informs the consumer that there is at least one content item available if he clicks on the content rotator **1416**.

When the consumer clicks on the content rotator **1416**, the screen changes to look like FIG. **16**. In this figure, the statement line **1412** now has an content **1614** where the blank space used to be. Again, continued clicking on the content rotator **1416** will cycle through the selected illuminations for this particular statement line **1412**.

In each of the foregoing, repeated clicking on the content rotator retrieves the particular selected illuminations that are associated with the merchant for that statement line. Thus a single credit card statement, with, for example, ten transaction lines, each having a set of five illuminations would present 50 illuminations to the consumer, available on a

32

merchant by merchant basis simply by clicking on the content rotator associated with each statement line.

While the foregoing examples of the content rotator are illustrated using a credit card statement with a set of merchants, each controlling a portion of the statement, the content rotator may be used in the context of any document transmitted to the consumer's computer, with one or more portions of the document associated with a number of potential illuminations that are selected by the Illuminations Sorter **816**. Each such portion may be owned by a different entity, which specifies the set of potential illuminations for the portion, and hence the underlying content, Boolean query, target and relevancy vectors. In this manner, the document, when presented to the consumer, will be customized with the selected illuminations from a number of different content providers. Thus, the present invention extends customization of information from a single document to an entire hypermedia collection, and thereby extends from the purely spatial dimensions of the display device to an additional dimension defined by the relevancy of content to the consumer's profile. The content rotator provides the navigational tool by which the consumer traverses this customized hypermedia collection.

2. Hierarchical Discrimination of Content

A content provider may have a very rich set of illuminations that may be targeted to very specific types of consumers on the basis of their attributes vectors. However, the richness of this set makes it difficult for the content provider to select which illuminations to provide in a document being transmitted to a consumer for matching against that consumer's profile.

For example, FIG. **14** the merchant in line **1404** is a bookseller, sending a large variety of different types of books. Further, assume that the attribute vector **808** includes a "children" aggregate attribute that is an aggregate of a number of more specific attributes, such as "infant/preschool," "young school age," "middle schoolers," and "high schoolers."

However, because the merchant on line **1404** can only send a few candidate illuminations (say, no more than 8) due to bandwidth or other limitations, it cannot transmit illuminations that target all the specific categories children's books plus all the categories of cookbooks, travel books, and so forth.

Therefore, the merchant chooses to make use of the hierarchical structure of the attribute vector to effect a hierarchical discrimination of its content. The first illumination candidates transmitted to the consumer's computer cover the broad areas of cooking, travel, sports, automotive, children, crafts, computers, and school. These illuminations will be processed by the Illumination Sorter **816** to determine which categories are most relevant to the consumer. The most relevant illumination will be displayed initially in the illuminated document, with the selected ones of the remaining illumination candidates available to the consumer via the content rotator, and ordered by their relevancy (e.g. match scores).

From this list, assume that the illumination for the "children" attribute is selected as the best match with the consumer. Indeed it may well be that the consumer has a new infant, but the merchant does not know this fact at the time the illumination is selected or presented to the consumer, because, as noted above, the illuminations are selected without their provider having any explicit access to the facts or model of the consumer.

When the consumer clicks on the content item **1408** ("Top 20 List of best selling books for your child"), the merchant's

server receives an explicit request for children's books. This request is then used to select a more specific set of potential illuminations to send to the consumer's computer. In effect, the merchant is now aware of the consumer's interest in children's books (as this information has been volunteered by the consumer when he clicked on the content item **1408**), but still does not know which sub-category of children is appropriate. Thus, the second set of candidate illuminations is directed to specific sub-categories within the children category (infant/preschool, young school age, middle schoolers, and high schoolers), and includes target vectors **1036** containing attributes corresponding to these specific sub-categories. The relevancy vectors **1038** is also set to restrict interest to only these attributes.

Using this second set of illuminations, the Illumination Sorter **816** now matches these target vectors **1036** to the consumer's attribute vector **808**. The infant/preschool category is found to have the highest match with the consumer's attribute vector, and the content shown in FIG. **17** is displayed, here as a separate window, instead of in the statement line.

A second consumer, in a different household may see the same content **1408** on his statement, and may also click on it. But in that consumer's lower level attribute vector **808**, the "young school age" sub-category may be the best match, so the content which is displayed from all the conditional illuminations is different, as shown in FIG. **18**.

This process of hierarchical discrimination may be repeated any number of times, thus providing for a very high degree of targeting without requiring any a priori knowledge about the particular consumer (e.g., without having to rent lists of consumer profiles tied to IP addresses, or storing a cookie in the consumer's browser). In addition, the consumer's privacy is assured (in particular the details of the database **804** and attribute vector **808**), as the only information going back to the merchant (or other content provider) is the information contained in the click on the content, as performed consciously and willingly by the consumer.

This discussion has assumed that the content provider has a static set of content items that are to be chosen from. However, that need not be the case. Parameterized content could make use of data in the consumer model to fill in portions of the content itself. In such as case, content such as content **1408** in FIG. **14** could be tailored to say "Top 20 list of best selling books for your infant" or "Top 20 list of best selling books for your young adult" where the italicized components are selected from the best matching attribute in the attribute vector **808**.

We claim:

1. A method of customizing a structured document delivered electronically to a consumer computer, the consumer computer including a display device, the method comprising:

receiving a structured document at the consumer computer, the structured document including a plurality of variable content sections, each variable content section having a plurality of selectable content alternatives;

for each variable content section, selecting a subset of the content alternatives for augmenting the section by evaluating the content alternatives with respect to a consumer profile of the consumer, ordering the subset of content alternatives into an order including a first content alternative, and augmenting the section with the first content alternative;

presenting the augmented structured document to the consumer on the display device with the first content alternative for each variable content section; and

enabling retrieval of the remaining content alternatives for each variable content section.

2. The method of claim 1, further comprising:

ordering the selected content alternatives for a variable content section by a function of their relevancy to the consumer profile.

3. The method of claim 1, further comprising:

presenting, in response to an action by the consumer with respect to one of the variable content sections, at least one of the remaining content alternatives for the variable content section.

4. The method of claim 1, further comprising:

presenting, in response to an action by the consumer with respect to one of the variable content sections, at least one of the remaining content alternatives for the variable content section in place of the first content alternative for the variable content section.

5. The method of claim 1, wherein evaluating the content alternatives with respect to a consumer profile of the consumer further comprises:

comparing a target vector of attributes associated with a content alternative with a vector of attributes associated with the consumer profile.

6. The method of claim 5, further comprising:

selecting at least one attribute from the target vector using a relevancy vector comprising relevancy values corresponding to at least one attribute of the target vector; and

comparing only those attributes of the target vector for which the relevancy values exceed a threshold.

7. The method of claim 6, wherein the relevancy value determines a relative importance of attributes of the target vector.

8. The method of claim 1, wherein evaluating the content alternatives with respect to a consumer profile of the consumer further comprises:

evaluating a Boolean query with respect to facts derived from transactions of the consumer.

9. The method of claim 1, wherein evaluating the content alternatives with respect to a consumer profile of the consumer further comprises:

evaluating a Boolean query with respect to logical abstractions derived from an attribute vector describing attributes of the consumer.

10. The method of claim 1, wherein the consumer profile includes a consumer attribute vector, comprising:

a base vector comprising a plurality of base level attributes of the consumer, each base level attribute having a value; and

at least one hierarchical vector comprising at least one aggregate attribute associated with a plurality of base level attributes of the base level vector, and having a value computed as a function of the values of the associated base level attributes.

11. A method of selecting content for presentation to a consumer, comprising:

storing a consumer model of the consumer including an attribute vector having a plurality of attributes of the consumer;

receiving a document associated with a plurality of selectable content alternatives, each selectable content alternative associated with a target vector representing expected attributes of a consumer;

receiving in association with each target vector a relevancy vector including a plurality of relevancy values,

35

each relevancy value associated with at least one attribute of the target vector, the relevancy value indicating a measure of relevancy of the associated attribute of the target vector;

scaling the attributes of the target vector by the relevancy value associated with each attribute;

comparing the attribute vector of the consumer with at least one of the scaled target vectors to determine a distance measure between the target vectors and the attribute vector;

selecting at least one of the content alternatives as a function of the distance measure; and

presenting the selected at least one content alternative to the consumer.

12. The method of claim 11, further comprising:

receiving in association with at least one of the plurality of selectable content alternatives a query with respect to at least one attribute of the attribute vector of the consumer; and

evaluating the query against the attribute vector of the consumer to determine whether the content alternative may be selected for presentation to the consumer.

13. The method of claim 12, wherein the query includes a priority value, and selecting at least one of the content alternatives as a function of the distance measure further comprises:

computing a match score for each content alternative as a function of the distance measure between the target vector associated with the content alternative and the attribute vector of the consumer, and the priority value of a query associated with the content alternative; and selecting the content alternative with a highest match score.

14. The method of claim 11, wherein the consumer model comprises:

a base vector comprising a plurality of base level attributes of the consumer, each base level attribute having a value; and

at least one hierarchical vector comprising at least one aggregate attribute associated with a plurality of base level attributes of the base level vector, and having a value computed as a function of the values of the associated base level attributes.

15. A method of updating a model of consumer attributes, comprising:

retrieving a plurality of transactions;

determining a measure of relevancy of each transaction to at least one attribute of a consumer responsive to a conditional probability of each transaction occurring given a value of the attribute; and

updating the at least one attribute as a function of the relevancy of each of the plurality of transactions.

16. The method of claim 15, wherein updating the at least one attribute is performed using Bayes Theorem using the conditional probability of each transaction.

17. The method of claim 15, wherein updating the at least one attribute further comprising:

assigning each transaction to a time period in an ordered sequence of time periods;

for any time period to which no transaction is assigned, establishing a measure of relevancy for the attribute for no transaction occurring within the time period; and

updating the at least one attribute according to the ordered sequence of time periods, using the measures of rel-

36

evancy of transactions in time periods in which the transactions occur, and the established measure of relevancy for the attribute for time periods in which no transactions occur.

18. The method of claim 17, wherein determining a measure of relevancy of each transaction comprises determining the conditional probability of each transaction occurring given a value of the attribute.

19. The method of claim 17, wherein updating the at least one attribute is performed using Bayes Theorem using the conditional probability of each transaction.

20. The method of claim 15, wherein the measure of relevancy of a transaction is a function of a monetary amount associated with the transaction.

21. The method of claim 15, wherein the measure of relevancy of a transaction is a function of at least one party to the transaction.

22. A method of selecting content for presentation to a consumer, the consumer associated with a consumer model describing attributes of the consumer, the content delivered electronically to a consumer computer, the consumer computer including a display device, the consumer associated with a consumer profile including a plurality of attributes of the consumer including at least one aggregated attributed having a value computed from a plurality of other attributes, the method comprising:

receiving a structured document at the consumer computer, the structured document including a variable content section having a first set of content alternatives; selecting a first content alternative for augmenting the section by evaluating attributes of the content alternatives as a function of corresponding attributes of the consumer profile of the consumer and ordering the first set of content alternatives into an order including the first content alternative;

presenting the structured document with the first content alternative on the display device;

receiving a consumer action indicating selection of the first content alternative;

sending in response to the consumer action a second set of variable content alternatives, including a content alternative having an attribute that contributes to an aggregate attribute of the first content alternative;

selecting a second content alternative by evaluating the attributes of second set of content alternatives as a function of corresponding attributes of the consumer profile of the consumer and ordering the second set of content alternatives into an order including the second content alternative; and

presenting the structured document with the second content alternative on the display device.

23. A method of customizing a structured document, the structured document including a plurality of variable content sections, each variable content section having a plurality of selectable content alternatives, the structured document electronically delivered to a consumer computer, the consumer computer including a display device, the method comprising:

for each variable content section, selecting a subset of the content alternatives for augmenting the section by evaluating the content alternatives with respect to a consumer profile of the consumer, ordering the subset of content alternatives into an order including a first content alternative, and augmenting the section with the first content alternative;

presenting the augmented structured document to the consumer on the display device with the first content alternative for each variable content section; and

37

enabling presentation to the consumer on the display device of the remaining content alternatives for each variable content section.

24. The method of claim 23, further comprising:

ordering the selected content alternatives for a variable content section by a function of their relevancy to the consumer profile.

25. The method of claim 23, further comprising:

presenting, in response to an action by the consumer with respect to one of the variable content sections, at least one of the remaining content alternatives for the variable content section.

26. The method of claim 23, further comprising:

presenting, in response to an action by the consumer with respect to one of the variable content sections, at least one of the remaining content alternatives for the variable content section in place of the first content alternative for the variable content section.

27. The method of claim 23, wherein evaluating the content alternatives with respect to a consumer profile of the consumer further comprises:

comparing a target vector of attributes associated with a content alternative with a vector of attributes associated with the consumer profile.

28. The method of claim 27, further comprising:

selecting at least one attribute from the target vector using a relevancy vector comprising relevancy values corresponding to at least one attribute of the target vector; and

38

comparing only those attributes of the target vector for which the relevancy values are exceed a threshold.

29. The method of claim 28, wherein the relevancy value determines a relative importance of attributes of the target vector.

30. The method of claim 29, wherein evaluating the content alternatives with respect to a consumer profile of the consumer further comprises:

evaluating a Boolean query with respect to facts derived from transactions of the consumer.

31. The method of claim 23, wherein evaluating the content alternatives with respect to a consumer profile of the consumer further comprises:

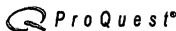
evaluating a Boolean query with respect to logical abstractions derived from an attribute vector describing attributes of the consumer.

32. The method of claim 23, wherein the consumer profile includes a consumer attribute vector, comprising:

a base vector comprising a plurality of base level attributes of the consumer, each base level attribute having a value; and

at least one hierarchical vector comprising at least one aggregate attribute associated with a plurality of base level attributes of the base level vector, and having a value computed as a function of the values of the associated base level attributes.

• • • • •

[Return to the USPTO NPL Page](#) | [Help](#)

Interface language:

English

Databases selected: Multiple databases...

Document View[« Back to Results](#)

Document 1 of 1

[Publisher Information](#)☐ Mark Document[Abstract](#) , [Full Text](#)**Visa sets up website to encourage online buyers; [2 Edition]***MORRISON, Tina-marie*. **Dominion**. Wellington, New Zealand: [Aug 24, 2000](#). pg. 22» [Jump to full text](#) » Translate document into: » [More Like This](#) - Find similar documents

People: [Kearney, Michael](#), [Swain, Paul](#)
Companies: [Visa International Inc](#) (NAICS: [522210](#) , Sic:[7389](#))
Author(s): [MORRISON, Tina-marie](#)
Column Name: [biz.com](#)
Section: [BUSINESS](#)
Publication title: [Dominion](#). Wellington, New Zealand: [Aug 24, 2000](#). pg. 22
Source type: Newspaper
ProQuest document ID: 58687652
Text Word Count 321
Document URL: [http://proquest.umi.com/pqdweb?
did=58687652&sid=2&Fmt=3&clientId=19649&RQT=309&VName=PQD](http://proquest.umi.com/pqdweb?did=58687652&sid=2&Fmt=3&clientId=19649&RQT=309&VName=PQD)

Abstract (Document Summary)

Visa's New Zealand site is being introduced after the success of its Australian site which has attracted 100,000 unique users since its start last September.

Mr [Michael Kearney] said the merchants linked to Visa's New Zealand site met a high standard of business practice and integrity, covering consumer privacy, customer service, and data and payment security.

Mr [Paul Swain] said once people felt more comfortable about shopping online, exponential growth would occur, and the Visa site was a step in the right direction.

Full Text (321 words)*Copyright Independent Newspapers, Ltd. Aug 24, 2000*

SECURITY concerns holding back online commerce have prompted credit card company Visa to set up a website to encourage online buying.

Visa International electronic commerce manager Michael Kearney said it was hoped the site would attract about a quarter of a million users.

The site, www.shopwithVISA.co.nz, has links to 19 online merchants and is to be heavily promoted before Christmas.

Visa is the most popular credit card in New Zealand, with 1.6 million cards in circulation.

The company says 65 per cent of all Internet transactions are by Visa card.

Visa's New Zealand site is being introduced after the success of its Australian site which has attracted 100,000 unique users since its start last September.

Mr Kearney said the merchants linked to Visa's New Zealand site met a high standard of business practice and integrity, covering consumer privacy, customer service, and data and payment security.

Commerce Minister Paul Swain welcomed the initiative, saying privacy and security were a long-standing concern for consumers.

Research commissioned by www.consult.co.nz found that 40 per cent of New Zealanders accessed the Internet during the past 12 months, but only 41 per cent of regular Internet users had bought online.

Mr Swain said once people felt more comfortable about shopping online, exponential growth would occur, and the Visa site was a step in the right direction.

The Government is developing its own e-commerce strategy for government services and information to be offered online by 2004. This is likely to encompass government tenders, voting, information on legislation and policy, and the ability to pay rates to local government online.

Mr Swain said the Government faced the same concerns as the private sector about privacy, confidentiality and security in the online environment.

It expected to have decided on a secure electronic platform for the services by the middle of next year.

[Illustration]

Caption: ANTHONY PHELPS Mr Swain and Mr Kearney check how the link to the online merchants works

More Like This - Find similar documents

People: ☐ Kearney, Michael ☐ Swain, Paul

Companies: ☐ Visa International Inc

NAICS: ☐ 522210

Sic: ☐ 7389

Author(s): ☐ MORRISON, Tina-marie

Language: ☐ English

Publication title: ☐ Dominion

Search

Clear

[^ Back to Top](#)

[<< Back to Results](#)

Document 1 of 1

[Publisher Information](#)

[Print](#)

[Email](#)

☐ Mark Document

[Abstract](#), [Full Text](#)

Copyright © 2006 ProQuest Information and Learning Company. All rights reserved. [Terms and Conditions](#)

[Text-only interface](#)



LEXSEE 464 F.3D 1286

**ALZA CORPORATION, Plaintiff-Appellant, v. MYLAN LABORATORIES, INC.
and MYLAN PHARMACEUTICALS, INC., Defendants-Appellees.**

06-1019

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

464 F.3d 1286; 2006 U.S. App. LEXIS 22616; 80 U.S.P.Q.2D (BNA) 1001

September 6, 2006, Decided

SUBSEQUENT HISTORY: Related proceeding at *Alza Corp. v. Impax Labs.*, 193 Fed. Appx. 973, 2006 U.S. App. LEXIS 22800 (Fed. Cir., Sept. 6, 2006)

PRIOR HISTORY: [**1] Appealed from: United States District Court for the Northern District of West Virginia. Chief Judge Irene M. Keeley. *Alza Corp. v. Mylan Labs., Inc.*, 388 F. Supp. 2d 717, 2005 U.S. Dist. LEXIS 22272 (N.D. W. Va., 2005)

DISPOSITION: AFFIRMED.

COUNSEL: Gregory L. Diskant, Patterson, Belknap, Webb & Tyler LLP, of New York, New York, argued for plaintiff-appellant. With him on the brief were Jeffrey I.D. Lewis, and Richard J. McCormick.

John B. Wyss, Wiley, Rein, & Fielding LLP, of Washington, DC, argued for defendants-appellees. With him on the brief were James H. Wallace, Jr., Kevin P. Anderson, and Robert J. Scheffel.

JUDGES: Before GAJARSA, Circuit Judge, CLEVENGER, Senior Circuit Judge, and PROST, Circuit Judge.

OPINION BY: GAJARSA

OPINION

[*1288] GAJARSA, *Circuit Judge*.

Alza Corp. ("Alza") appeals from the district court's judgment, after a bench trial, of noninfringement and invalidity of claims 1-3, 11, 13 and 14 of *U.S. Patent No.*

6,124,355 ¹ ("the '355 patent") in favor of Mylan Laboratories, Inc. and Mylan Pharmaceuticals, Inc. (collectively, "Mylan"). *Alza Corp. v. Mylan Labs., Inc.*, 388 F. Supp. 2d 717 (N.D.W. Va. 2005) ("Alza II"). The infringement arose from Mylan's filing of two Abbreviated New Drug Applications ("ANDAs") for a generic version of the once-a-day extended release [**2] formulation of the anti-incontinence drug oxybutynin, *id.* at 720, which Alza has been marketing as Ditropan XL(R). *Id.* at 738. This court has jurisdiction pursuant to 28 U.S.C. § 1295(a)(1). For the reasons stated below, we affirm the district court's judgment of noninfringement and invalidity.

I The '355 patent issued to Guittard et al. and was assigned to Alza.

I. BACKGROUND

This litigation arose from Mylan's and Impax's filings of ANDAs for once-daily, controlled-release oxybutynin formulations. Oxybutynin is a drug used to treat urinary incontinence. Once-a-day dosing provides the usual benefits of convenience, steady-dosing, and in addition, possibly reduced absorption of a metabolite that leads to side-effects. Claim 2 of the '355 patent is representative.

2. A sustained-release oxybutynin formulation for oral administration to a patient in need of treatment for urge incontinence comprising a therapeutic dose of an oxybutynin selected from the group consisting of oxybutynin and its pharmaceutically acceptable salt that delivers from 0 to 1 mg in 0 to 4 hours,

from 1 mg to 2.5 mg in 0 [**3] to 8 hours, from 2.75 to 4.25 mg in 0 to 14 hours, and 3.75 mg to 5 mg in 0 to 24 hours for [**1289] treating urge incontinence in the patient.

col. 17, ll. 31-38 (emphasis added).

The district court construed the '355 patent claims in its *Markman* Order, reported at *Alza Corp. v. Mylan Labs., Inc.*, 349 F. Supp. 2d 1002 (N.D.W. Va. 2004) ("*Alza I*"). The court construed the word "deliver" to refer to the rate of *in vivo* release in the gastrointestinal ("GI") tract. *See id.* at 1019.

Alza did not present direct evidence that Mylan's ANDA formulation released drug in the GI tract at the rates claimed by the '355 patent. However, it did offer two other types of evidence: 1) the rate at which the generic product released oxybutynin in an *in vitro* dissolution apparatus, and 2) the rate at which the ANDA product resulted in the accumulation of oxybutynin in the bloodstream.

The district court found that Alza had failed to meet its burden of proof on infringement. The district court also found the asserted claims of the '355 patent to be invalid as both anticipated and obvious in light of the prior art. For the reasons stated below, we affirm [**4] the invalidity holding on obviousness grounds, and consequently, we do not need to reach Alza's arguments regarding anticipation. We also affirm the holding of noninfringement.

II. DISCUSSION

A. Standard of review

Infringement is a question of fact that, after a bench trial, we review for clear error. *See, e.g., Ferguson Beauregard/Logic Controls, Div. of Dover Res., Inc. v. Mega Sys., LLC*, 350 F.3d 1327, 1338 (Fed. Cir. 2003). Under the clear error standard, a reversal is permitted only when this court is left with a definite and firm conviction that the district court was in error. *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1164 (Fed. Cir. 2006).

As for obviousness, a claimed invention is unpatentable if the differences between it and the prior art are "such that the subject matter as a whole would have

been obvious at the time the invention was made to a person having ordinary skill in the art." 35 U.S.C. § 103(a) (2000); *In re Kahn*, 441 F.3d 977, 985 (Fed. Cir. 2006) (citing *Graham v. John Deere Co.*, 383 U.S. 1, 13-14, 86 S. Ct. 684, 15 L. Ed. 2d 545, (1966)). Obviousness is a question [**5] of law, reviewed *de novo*, based upon underlying factual questions which are reviewed for clear error following a bench trial. *Ruiz v. A.B. Chance Co.*, 357 F.3d 1270, 1275 (Fed. Cir. 2004). These "underlying factual inquiries includ[e]: (1) the scope and content of the prior art; (2) the level of ordinary skill in the prior art; (3) the differences between the claimed invention and the prior art; and (4) objective evidence of nonobviousness." *In re Dembiczak*, 175 F.3d 994, 998 (Fed. Cir. 1999). Similarly, "[t]he presence or absence of a motivation to combine references in an obviousness determination is a pure question of fact." *In re Gartside*, 203 F.3d 1305, 1316 (Fed. Cir. 2000); *accord Winner Int'l Royalty Corp. v. Wang*, 202 F.3d 1340, 1348 (Fed. Cir. 2000), as is the presence or absence of a "reasonable expectation of success" from making such a combination, *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1165 (Fed. Cir. 2006). Because "a patent retains its statutory presumption of validity, *see* 35 U.S.C. § 282, . . . the movant retains the burden to show the invalidity [**6] of the claims by clear and convincing evidence as to underlying facts." *McGinley v. Franklin Sports, Inc.*, 262 F.3d 1339, 1349 (Fed. Cir. 2001) (internal quotations omitted).

In *Graham*, the Court held that the obviousness analysis begins with several basic factual inquiries: "[l] (1) the scope [**1290] and content of the prior art are to be determined; [(2)] differences between the prior art and the claims at issue are to be ascertained; and [(3)] the level of ordinary skill in the pertinent art resolved." 383 U.S. at 17. After ascertaining these facts, the Court held that the obviousness *vel non* of the invention is then determined "against th[e] background" of the *Graham* factors. *Id.* at 17-18 (emphasis added). Clearly, the Court recognized the importance of guarding against hindsight, as is evident in its discussion of the role of secondary considerations as "serv[ing] to guard against slipping into use of hindsight and to resist the temptation to read into the prior art the teachings of the invention in issue." *Id.* at 36.

The Court of Appeals for the Federal Circuit's and its predecessor's "motivation [**7] to combine" requirement likewise prevents statutorily proscribed hindsight

reasoning when determining the obviousness of an invention. *Kahn*, 441 F.3d at 986 ("[T]he 'motivation-suggesting-teaching' requirement protects against the entry of hindsight into the obviousness analysis."); *In re Fridolph*, 30 CCPA 939, 942, 134 F.2d 414, 1943 Dec. Comm'r Pat. 350 (1943) ("[I]n considering more than one reference, the question always is: does such art suggest doing the thing the [inventor] did."). According to the "motivation-suggesting-teaching" test, a court must ask "whether a person of ordinary skill in the art, possessed with the understandings and knowledge reflected in the prior art, and motivated by the general problem facing the inventor, would have been led to make the combination recited in the claims." *Kahn*, 441 F.3d at 988 (citing *Cross Med. Prods., Inc., v. Medtronic Sofamor Danek, Inc.*, 424 F.3d 1293, 1321-24 (Fed. Cir. 2005)).

This requirement has been developed consistent with the Supreme Court's obviousness jurisprudence as expressed in *Graham* and the text of the obviousness statute that directs us to conduct the obviousness [*8] inquiry "at the time the invention was made" 35 U.S.C. § 103. As we explained in *Kahn*,

The motivation-suggestion-teaching test picks up where the analogous art test leaves off and informs the *Graham* analysis. To reach a non-hindsight driven conclusion as to whether a person having ordinary skill in the art at the time of the invention would have viewed the subject matter as a whole to have been obvious in view of multiple references, the Board must provide some rationale, articulation, or reasoned basis to explain why the conclusion of obviousness is correct. The requirement of such an explanation is consistent with governing obviousness law

441 F.3d at 987. We further explained that the "motivation to combine" requirement "[c]ontails consideration of both the 'scope and content of the prior art' and 'level of ordinary skill in the pertinent art' aspects of the *Graham* test." *Id.* at 986.

At its core, our anti-hindsight jurisprudence is a test that rests on the unremarkable premise that legal determinations of obviousness, as with such

determinations generally, should be based on evidence rather [*9] than on mere speculation or conjecture. Our court's analysis in *Kahn* bears repeating:

A suggestion, teaching, or motivation to combine the relevant prior art teachings *does not have to be found explicitly in the prior art*, as "the teaching, motivation, or suggestion may be implicit from the prior art as a whole, rather than expressly stated in the references. . . . The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be [*1291] solved as a whole would have suggested to those of ordinary skill in the art." However, rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be *some* articulated reasoning with *some* rational underpinning to support the legal conclusion of obviousness. This requirement is as much rooted in the Administrative Procedure Act [for our review of Board determinations], which ensures due process and non-arbitrary decisionmaking, as it is in § 103.

441 F.3d at 987-88 (quoting *In re Kotzab*, 217 F.3d 1365, 1370 (Fed. Cir. 2000)) (citations omitted) (emphases added)). There is [*10] flexibility in our obviousness jurisprudence because a motivation may be found *implicitly* in the prior art. We do not have a rigid test that requires an actual teaching to combine before concluding that one of ordinary skill in the art would know to combine references. This approach, moreover, does not exist merely in theory but in practice, as well. Our recent decisions in *Kahn* and in *Cross Medical Products* amply illustrate the current state of this court's views. See *Kahn*, 441 F.3d at 988 (affirming the PTO's obviousness finding, explaining that a motivation to combine may be found in implicit factors, such as the "knowledge of one of ordinary skill in the art, and [what] the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art"); *Cross Med. Prods.*, 424 F.3d at 1322 (reversing a district court ruling of nonobviousness and explaining that "the motivation to combine need not be found in prior art references, but equally can be found in the knowledge

generally available to one of ordinary skill in the art" such as knowledge of a problem to be solved).

In conclusion, our approach has [*11] permitted us to continue to address an issue of law not readily amenable to bright-line rules, as we recall and are guided by the wisdom of the Supreme Court in striving for a "practical test of patentability." *Graham*, 383 U.S. at 17.

B. Description of the technology

The patent at issue is directed generally to an extended release form of oxybutynin. Because the subject matter of the patent falls roughly under the rubric of pharmacology, we give a brief orientation to the field, based upon the record. In general, when a drug is swallowed, it is (1) dissolved in the gastrointestinal ("GI") tract; (2) absorbed from the GI tract into the bloodstream; (3) distributed from the blood into body tissues; and (4) metabolized and eliminated from the bloodstream. The GI tract includes the stomach, small intestine and the colon, and orally administered drugs pass through these portions of the GI tract in turn. Drugs may be administered in different dosage forms,² which may include not only the drug itself but also ingredients intended to modulate the rate of release of the drug from the dosage form.

2 Here we are discussing oral dosage forms, specifically.

[*12] Dosage forms may be described as immediate-release, e.g., such as where the drug is quickly released in the stomach, or as sustained/extended-release, where the drug is slowly released as the formulation traverses the GI tract. The rate of absorption of a drug from the GI tract into the bloodstream may change as it passes through the GI tract. The rate of absorption for a dissolved drug in a given portion of the GI tract also varies from drug to drug.

After roughly 8-12 hours a typical dosage form will reach the colon. If, hypothetically, a particular drug is simply not absorbed from the colon into the bloodstream, [*1292] then it may make little sense to develop an extended-release dosage form that is capable of "withholding" the release of some fraction of that drug until it reaches the colon. In other words, under these hypothetical conditions, there may be little motivation to design an oral dosage form capable of releasing drug more slowly than over an approximately 8-12 hour time

course, because such drug would be released in the colon, where it is (hypothetically) not absorbed.

The '355 patent claims an extended release oxybutynin formulation. Alza argues that one of ordinary [*13] skill in the art would not have believed that oxybutynin could be absorbed in the colon. Absent such absorption, Alza contends that one of ordinary skill in the art lacked the motivation to make the claimed extended release formulation, and that the district court therefore erred in holding that the asserted claims are invalid as obvious over the prior art. For the reasons set forth below, Alza's arguments fail.

C. Invalidity

The district court based its invalidity holding both on anticipation and obviousness grounds. Because we affirm its holding based on obviousness, we do not need to address the parties' anticipation arguments.

In finding the asserted claims of the '355 patent to be obvious, the district court considered, *inter alia*, the following prior art: *U.S. Patent Nos. 5,399,359* ("the Baichwal patent"); 5,082,688 ("the Wong patent"); and 5,330,766 ("the Morella patent").

The Morella patent discloses a "sustained-release pharmaceutical composition including an active ingredient of high solubility in water" According to the specification, highly soluble drugs had posed special challenges for the development of sustained release forms, which the inventors [*14] had set out to solve. "Sustained-release" is defined as release of the active ingredient at a rate that maintains therapeutic, non-toxic blood levels "over an extended period of time e.g. 10 to 24 hours or greater." Highly water soluble drugs were considered to be those having an aqueous solubility of at least roughly 1 part in 30. The commercially available hydrochloride salt of oxybutynin is freely soluble at neutral pH. The patent uses morphine as an example of an active ingredient that can be used in its compositions. Figure 5 demonstrates that one such composition is capable of dispensing morphine at what appears to be an approximately steady rate over the course of 24 hours. Claim 2 of the patent claims "genitourinary smooth muscle relaxants" as one of several types of active ingredients to use in the dosage form identified in claim 1. The specification also identifies oxybutynin as a highly water soluble genitourinary smooth muscle relaxant. Morella also teaches that "the dissolution rate of the

soluble drug at various pH's can be modified at will."

The Baichwal patent teaches a 24 hour extended release oxybutynin formulation. These formulations use an enteric-coated polymer [*15] matrix similar to Mylan's accused product. It also teaches methods of modifying the dosage forms to slow the release rates. During prosecution of the '355 patent, the inventor overcame an anticipation rejection by arguing that his invention had a release rate slower than those of the dissolution data presented in Baichwal. ³ The examiner agreed and withdrew his rejection.

³ Tables 15 and 18 of Baichwal, for example, disclose *in vitro* dissolution rates in which roughly half of the drug is dissolved by four hours.

[*1293] The Wong patent teaches a bilayer osmotic pump dosage form ("the OROS system") used in the preferred embodiment of the '355 patent. Wong teaches that this system can be used to deliver any drug over a 24 hour period, and Figure 11 of the patent discloses release rates falling within the claimed release rates of the '355 patent. The Wong patent does not specifically teach using oxybutynin with the claimed release technology, but it does teach using several categories of drugs of which oxybutynin is a member, such as anti-cholinergics, analgesics, muscle relaxants and urinary tract drugs.

In analyzing the obviousness issue, the district court first [*16] identified the level of ordinary skill in the art, finding the person of ordinary skill to have either an advanced degree in pharmacy, biology, chemistry or chemical engineering and at least two years of experience with controlled-release technology; or a bachelor's degree in one (or more) of those fields plus five years of experience with such technology. Second, the court examined whether there was a motivation "in the prior art or elsewhere that would have led one of the ordinary skill in the art to combine references." *Alza II*, 388 F. Supp. 2d at 737 (citing *Ruiz*, 234 F.3d 654 at 664 (internal quotations omitted)), and with a "reasonable expectation of success," *id.* (citing *In re O'Farrell*, 853 F.2d 894, 904 (Fed. Cir. 1988)). Third, the district court examined secondary considerations of nonobviousness. After making these factual determinations, it concluded that Mylan had established a strong *prima facie* case of obviousness, which Alza had failed to rebut through secondary considerations. The court concluded that Mylan had demonstrated Alza's patent to be invalid for

obviousness by clear and convincing evidence. ⁴ We agree. [*17]

4 Having reviewed Alza's sundry contentions that the district court made findings inconsistent with the appropriate burdens of proof for infringement and invalidity, we find them to be without merit.

While we have carefully considered all of the parties' arguments, we discuss principally the dispute over satisfaction of one predicate to a finding of obviousness: that a person of ordinary skill in the art would have had a "motivation to combine" the prior art to achieve the claimed invention and that she would have had a "reasonable expectation of success" in doing so. As an initial matter, we agree with the district court that "on a purely mechanical level, a person of ordinary skill in the art would have a reasonable expectation of success of manufacturing a 24 hour controlled-release oxybutynin formulation once motivated to use oxybutynin." *Id.* at 739. For example, Wong teaches a rate adjustable extended release dosing technology and release rates falling within the claimed parameters. Baichwal and Wong likewise teach ways of achieving slow rates of release, with Baichwal actually teaching extended-release oxybutynin, although arguably not as [*18] slowly as is claimed in the '355 patent. ⁵

5 The patent examiner initially rejected the '355 patent as anticipated by Baichwal, but subsequently allowed its issuance.

Indeed, Alza's principal argument is that no one of ordinary skill in the art would have been motivated to adapt the Morella, Baichwal and Wong technology to oxybutynin in the *first place*, because a person of ordinary skill in the art would have had no reason to expect that such an extended release oxybutynin formulation would have therapeutic value. The issues, as explained above, reduce essentially to whether one of ordinary skill in the art in 1995 would have had a reasonable expectation [*1294] that oxybutynin would be colonically absorbed and therefore would have been motivated to produce the claimed extended release formulation.

The district court concluded that "the weight of the evidence clearly and convincingly establishes that a person of ordinary skill in the art in 1995 would reasonably expect oxybutynin to absorb in the colon . . .

[and] have a reasonable expectation of success of producing a 24 hour oxybutynin formulation meeting the claims of the '355 patent." ⁶ *Alza II*, 388 F. Supp. 2d at 740. [**19] Alza argues, however, that the district court erred because "[t]here was no prior art evidence supporting this finding." According to Alza, "[t]here was no contemporaneous documentation supporting the view that any one factor—lipophilicity or anything else—existed to identify successful candidates for once-a-day delivery." It also argues that two prior art references "decisively undercut" the opinion of Mylan's expert, Dr. Amidon, which the district court cited in support of its conclusion. *See Alza II*, 388 F. Supp. 2d at 739-740.

6 The '355 patent issued on September 26, 2000 and claimed priority as far back as 1995. *See '355 patent*, col. 1, ll. 5-12. The district court treated 1995 as the relevant date for the obviousness inquiry, *see Alza II*, 388 F. Supp. 2d at 740, as do both parties in their obviousness arguments before this court. *See, e.g., Alza Reply Br.* at 13 (stating that "[t]he dispositive obviousness issue was whether colonic absorption of oxybutynin was reasonably expected in 1995") (emphasis added); *Mylan Br.* at 6 & n.2 (referring to evidence establishing "the clear expectation of one skilled in the art in 1995" and noting in a footnote that 1995 is "[t]he earliest possible date to which Alza asserts priority.") (emphasis added).

[**20] As an initial matter, it is essential to recognize that, as we have explained above, under our non-rigid "motivation-suggesting-teaching" test, a suggestion to combine need not be found in the prior art. *See Cross Med. Prods.*, 424 F.3d at 1322 ("[T]he motivation to combine need not be found in prior art references, but equally can be found in the knowledge generally available to one of ordinary skill in the art . . ."). Accordingly, where the testimony of an expert witness is relevant to determining the knowledge that a person of ordinary skill in the art would have possessed at a given time, this is one kind of evidence that is pertinent to our evaluation of a *prima facie* case of obviousness. We now turn to consider whether the relevant evidence, including the expert testimony and the prior art, when viewed as a whole supports the findings of the district court. We conclude that the findings of the district court were not clearly erroneous.

Mylan's expert, Dr. Amidon, testified that based on

its lipophilicity, he would "expect oxybutynin to be a highly permeable" compound that is "rapidly absorbed" along the length of the GI tract, including the colon. [**21] Later, when challenged about the predictive value of lipophilicity, Dr. Amidon explained, "I would say there were some unknowns, but again lipophilic drugs would be well absorbed. That would be—that was the general understanding at the time."

Although Alza argues that two prior art references "decisively undercut Dr. Amidon's hindsight opinion," these references are in fact not inconsistent with the general principle that the extent of a drug's colonic absorption correlates with its lipophilicity. Indeed, the first reference, a 1990 publication in the *Journal of Pharmaceutical Sciences*, states that "[i]n general, the more lipophilic drugs were transported rapidly." P. Artursson, *Epithelial Transport of Drugs in Cell Culture. I: A Model for Studying the Passive Diffusion of Drugs over Intestinal Absorptive (Caco-2) Cells*, 79 J. Pharm. Sci. 476, 481 (1990). [**1295] Alza, however, cites this reference narrowly for its observation that a highly lipophilic analog of a particular drug did not follow the general rule that lipophilic drugs were transported more quickly. *Id.* Granted, the authors admit that "[t]he reason for this [deviation] is currently unknown," and they postulate [**22] that it may be related to a physicochemical factor other than lipophilicity, namely steric hindrance. ⁷ *Id.* But the mere fact that the colonic absorption rate of a drug may be predicted most precisely by using "many factors," rather than "lipophilicity" alone, does not negate the general predictive utility of lipophilicity in estimating the extent of colonic absorption.

7 Dr. Chancellor, Alza's expert, likewise characterized colonic absorption as having been understood as being dependent on several physicochemical and physiological variables, of which lipophilicity was one.

The second prior art reference cited by Alza, *Absorption of Polar Drugs Following Caecal Instillation in Healthy Volunteers*, is similarly unavailing to it. Riley, et al., 6 *Aliment. Pharmacol. Ther.* 701, 705 (1992). Again, this reference teaches that while the correlation is not perfect, lipophilicity tended to suggest colonic absorption, stating that "[t]he relationship between the physical characteristics of a drug and its colonic absorption is not yet clear but studies in the rat suggest

that *lipophilic drugs are well absorbed along the length of the gastrointestinal tract* [*23] , whereas hydrophobic polar drugs are absorbed much less from the colon than from the small intestine." *Id.* (emphasis added).

Far from teaching away or detracting from the weight of Dr. Amidon's testimony, these prior art references, taken as a whole, are entirely consistent with the finding that in 1995 a person of ordinary skill in the art would have expected a general, albeit imperfect, correlation between a drug's lipophilicity and its colonic absorptivity. Accordingly, we cannot perceive clear error in the district court's factual findings that while colonic absorption was not *guaranteed*, the evidence, viewed as a whole, is clear and convincing that a person of ordinary skill in the art would nonetheless have perceived a reasonable likelihood of success and that she would have been motivated to combine prior art references to make the claimed invention.

Likewise, we find no error in the district court's consideration of secondary indicia of obviousness. We therefore affirm its legal conclusion of obviousness, finding the district court to have correctly held that Mylan met its burden of overcoming the presumption of validity that attaches to an issued patent.

D. [*24] *Infringement*

The '355 *patent* specifically describes the rate of oxybutynin release from its "extended release" formulations, requiring that the time-course of *in vivo* oxybutynin release falls within certain boundaries. That is, at certain times, the cumulative amount of dissolved (released) drug must fall within certain ranges. To prove infringement, Alza bore the burden of proving, *inter alia*, that Mylan's accused generic formulation exhibited an *in vivo* release profile falling within the claimed ranges at the relevant times.

At trial, Alza presented no direct evidence of how quickly the accused product dissolved *in vivo*. *Alza II*, at 722. However, it did offer two kinds of indirect evidence as measures of the rate of *in vivo* release. *Id.* First, it presented evidence of the blood plasma concentration versus time profiles for both the accused ANDA formulation and Ditropan, an embodiment [*1296] of the '355 *patent*. Second, it presented evidence of the rate of release not in the GI tract but in pieces of laboratory apparatus under certain experimental conditions,

so-called *in vitro* dissolution. The critical deficiency in the evidence presented by Alza was not [*25] that it was "indirect" rather than "direct," but rather that it failed to credibly link these pieces of evidence with the relevant pharmacokinetic parameter--the rate of *in vivo* dissolution in the GI tract.

Thus, the district court explained that Alza had failed to demonstrate how evidence of the rate of dissolution of drug in the GI tract could be extracted from plots of plasma concentration versus time. The district court accepted Alza's simplifying assumption about oxybutynin rapidly being absorbed following dissolution such that the rates of *in vivo* dissolution parallel the rate of drug uptake into the blood. However, it found that only one expert, Dr. Amidon, had "endorsed Alza's subjective comparison of blood plasma levels with *in vivo* release rates." As for that one expert, moreover, he "rejected the very conclusion that Alza attributed to him."

Alza criticizes the district court for "fail[ing] to come to grips with the significance of the testimony" that Dr. Amidon "recanted . . . immediately after he made it." Specifically, Alza urges that notwithstanding the expert's recantation, we should nonetheless draw our independent conclusions from the "point of his [*26] testimony" that release rates in blood and the appearance in the GI tract are essentially the same. We have considered Alza's arguments and find them to lack legal and factual coherency. Even if we were to presume to be experts and to apply the simplifying assumption that the drug is rapidly taken up into the bloodstream upon dissolution, it is not clear to us how to abstract from each plasma concentration versus time curve the rate of uptake into the bloodstream. This would require factoring out of the curve the effects, *inter alia*, of the elimination of drug from the bloodstream over the relevant 24 hour period. But this is not our province. Such evidence, if it exists, must have been presented at trial, or in its stead other evidence sufficient to persuade the trial court.

From what can be discerned, Dr. Amidon's immediately recanted statement appears to have been based on his comparison of the relative areas under the curves of plasma concentration versus time plots of both the accused ANDA formulation and Ditropan XL. Indeed, Alza reproduces in its appellate brief Dr. Amidon's testimony that the accused product has only 92 to 93 percent of the area under the curve of Ditropan [*27] XL. This appears to have resulted in the drawing

of a line (referred to by the parties as "line A") on a plot of *in vitro* dissolution of both Ditropan XL and the accused ANDA formulation, wherein the rate of *in vitro* dissolution of Mylan's ANDA formulation has been adjusted according to that percentage. The basis for, and significance of, line A is simply not apparent from the record, and Alza fails to provide us with any persuasive line of argument as to how we should imbue line A with any relevant meaning. In short, we agree with Mylan that the plasma concentration versus time data fail to establish *in vivo* release rates for either Ditropan XL or the accused ANDA product.

The district court similarly found unpersuasive Alza's evidence that Ditropan XL and the accused ANDA product sometimes exhibited *in vitro* dissolution rates falling within the claims. The court cited testimony by Dr. Amidon explaining that these *in vitro* procedures are "not designed to reflect the *in vivo* dissolution process." This accords with the common sense notion that one cannot simply proclaim without proof that he has constructed an apparatus capable of mimicking pertinent [*1297] environmental [*28] variables of the GI tract (along the length of the tract, nonetheless). Indeed, the obtained *in vitro* dissolution rates vary widely with the choice of experimental parameters. We agree with the district court that Alza's evidence of *in vitro* dissolution rates is irrelevant absent evidence demonstrating that the *in vitro* system is a good model of actual *in vivo* behavior. On that point, Alza's evidence is severely lacking.

We therefore affirm the district court's finding of noninfringement. In so doing we explicitly reject Alza's suggestion that the district court erred in failing to specifically state that not only did it find Alza's plasma concentration data and its "*in vitro*" data to be inadequate in isolation, but that it had also found the data to be inadequate in combination. Even if we were to entertain the suggestion that the district court was in fact unfamiliar with the basic precept that it is the totality of the evidence that it must consider in making factual determinations, we would merely conclude that whereas here, if each of two pieces of evidence, assessed separately, is severely inadequate to support a proposition, when their probative values are [**29] tallied, they still fall short. While it is possible to envision cases in which two pieces of evidence may create great probative value synergistically, this is not one of those cases.

* * *

In conclusion, we affirm the judgment of the district court that the asserted claims of the '355 patent were invalid, and that notwithstanding, the patent was not infringed.

AFFIRMED.

Costs to Mylan.

LEXSEE 396 U.S. 57

ANDERSON'S-BLACK ROCK, INC. v. PAVEMENT SALVAGE CO., INC.

No. 45

SUPREME COURT OF THE UNITED STATES

396 U.S. 57; 90 S. Ct. 305; 24 L. Ed. 2d 258; 1969 U.S. LEXIS 3322; 163 U.S.P.Q.
(BNA) 673

November 10, 1969, Argued
December 8, 1969, Decided

PRIOR HISTORY: CERTIORARI TO THE
UNITED STATES COURT OF APPEALS FOR THE
FOURTH CIRCUIT.

DISPOSITION: 404 F.2d 450, reversed.

SUMMARY:

The plaintiff had a patent for combining on one paving machine chassis (1) a radiant burner for heating the exposed edge of a cold strip of pavement, and (2) equipment for spreading and shaping asphalt. The purpose of heating the exposed edge was to make it pliable and thereby to improve the bonding between strips of pavement. Rejecting the plaintiff's claim that the defendant had infringed the plaintiff's patent, a Federal District Court found the patent invalid. The Court of Appeals for the Fourth Circuit reversed. (404 F.2d 450.)

On certiorari, the United States Supreme Court reversed. In an opinion by Douglas, J., expressing the unanimous view of the court, it was held that the combination which was the subject matter of the plaintiff's patent was reasonably obvious to one with ordinary skill in the art and was thus not a patentable invention.

Burger, Ch. J., did not participate.

LAWYERS' EDITION HEADNOTES:

[***LEdHN1]

PATENTS §64

prior knowledge -- combination --

Headnote:[1]

The combination on one paving machine chassis of equipment for spreading and shaping asphalt, having been known in the prior art, is not a patentable invention.

[***LEdHN2]

PATENTS §57

prior knowledge -- radiant burner --

Headnote:[2]

The use of a radiant-heat burner in working asphalt pavement, having been known in the prior art and disclosed in a previous patent, is not, by itself, patentable.

[***LEdHN3]

PATENTS §40

combination -- obviousness --

Headnote:[3A][3B]

Even if the combination on one paving machine chassis of (1) a radiant burner for heating the exposed edge of a cold strip of pavement, and (2) equipment for spreading and shaping asphalt, has filled a long-felt want, has performed a useful function, and has enjoyed commercial success, such a combination is reasonably obvious to one with ordinary skill in the art and is thus not a patentable invention, where (1) the presence of the radiant burner in the same machine as the other equipment is not critical or essential to the burner's function in curing the problem of a cold joint between

strips of pavement and hence adds nothing to the nature and quality of a radiant burner already patented; and (2) the combination does not result in an effect greater than the sum of the several effects taken separately.

[***LEdHN4]

PATENTS §2

power of Congress --

Headnote:[4]

The patent standard is basically constitutional, Article I, 8, of the Constitution authorizing Congress to promote the progress of useful arts by allowing inventors monopolies for limited times; under this power, Congress may not enlarge the patent monopoly without regard to the innovation, advancement, or social benefit gained thereby, nor may Congress authorize the issuance of patents whose effects are to remove existent knowledge from the public domain or to restrict free access to materials already available.

[***LEdHN5]

PATENTS §1

inherent requisites --

Headnote:[5]

Innovation, advancement, and things which add to the sum of useful knowledge are inherent requisites in a patent system which by constitutional command must promote the progress of useful arts, and this standard, expressed in the Constitution, may not be ignored.

[***LEdHN6]

PATENTS §19.1

obviousness --

Headnote:[6]

In resolving the issue of obviousness for purposes of deciding whether a patent may be obtained, the scope and content of the prior art are to be determined, differences between the prior art and the claims at issue are to be ascertained, and the level of ordinary skill in the pertinent art is to be resolved; and strict observance of these requirements is necessary.

SYLLABUS

Respondent brought this action for infringement of a patent for "Means for Treating Bituminous Pavement." The patent sought to solve the problem of a cold joint on "blacktop" paving by combining known elements, a radiant-heat burner, a spreader, and a tamper and screed, on one chassis. The District Court, finding that all the inventor had done was to construct known elements in the prior art on a single chassis, held the patent invalid. The Court of Appeals reversed. *Held*: While the combination of old elements performed a useful and commercially successful function it added nothing to the nature and quality of the previously patented radiant burner, and to those skilled in the art the use of the old elements in combination was not an invention under the standard of 35 U. S. C. § 103. Pp. 59-63.

COUNSEL: Alan W. Borst argued the cause for petitioner. With him on the brief was Nathaniel L. Leek.

Walter J. Blenko, Jr., argued the cause and filed a brief for respondent.

JUDGES: Black, Douglas, Harlan, Brennan, Stewart, White, Marshall; Burger took no part in the decision of this case.

OPINION BY: DOUGLAS

OPINION

[*57] [***260] [***306] MR. JUSTICE DOUGLAS delivered the opinion of the Court.

Respondent brought this action against petitioner for infringement of *United States Patent No. 3,055,280* covering "Means for Treating Bituminous Pavement." The patent was assigned to respondent by one Neville.

Bituminous concrete -- commonly called asphalt or "blacktop" -- is often laid in strips. The first strip laid usually has cooled by the time the adjoining strip is to be laid, creating what is known as a cold joint. [*58] Because bituminous concrete is pliable and capable of being shaped only at temperatures of 250 degrees to 290 degrees F., the cold joint results in a poor bonding between the strips. Water and dirt enter between the strips, causing deterioration of the pavement.

Respondent's patent sought to solve the problem of

the cold joint by combining on one chassis (1) a radiant-heat burner for heating the exposed edge of the cold strip of pavement; (2) a spreader for placing bituminous material against that strip; and (3) a tamper and screed, for shaping the newly placed material to the desired contour and surface.

[***LEdHR1] [1]The standard paving machine in use prior to respondent's claimed invention combined on one chassis the equipment for spreading and shaping the asphalt, and it is unquestioned that this combination alone does not result in a patentable invention. Petitioner's alleged infringement resulted from its placing of a radiant-heat burner on the front of a standard paving machine, thus allowing its machine to perform the same functions with the same basic elements as those described in respondent's patent.

[***LEdHR2] [2]The use of a radiant-heat burner in working asphalt pavement dates back to a patent issued in 1905 to one Morcom, *United States Patent No. 799,014*. The value of such a heater lies in the fact that it softens the asphalt without burning the surface. The radiant-heat burner on respondent's claimed invention is essentially the same as that disclosed in a patent issued in 1956 to one Schwank, *United States Patent No. 2,775,294*. Thus the burner, by itself, is also not patentable.

The placement of the radiant-heat burner upon the side of a standard bituminous paver is the central feature of respondent's patent. The heater is used [**307] in this way for continuous paving along a strip to prevent a cold joint, whereas previously radiant-heat burners had [59] been used merely for patching limited areas of asphalt. The operation of the heater is, however, in no way dependent on the operation of the other equipment on the paving machine. It is hung on the paver merely because that is a convenient place for it when heating the longitudinal joint of the pavement. A separate heater can also be used in conjunction with a standard paving machine to eliminate the cold joint, and in fact is so used for heating the transverse joints of the pavement.

Respondent claims that its patent involves a combination of prior art which produces the new and useful result of eliminating the cold joint. Its claim of unobviousness is based [***261] largely on the testimony of two individuals who are knowledgeable in the field of asphalt paving, expressing their doubts to the inventor Neville that radiant heat would solve the

problem of cold joints. The District Court rejected respondent's claim of infringement, finding the patent invalid. The Court of Appeals, by a divided vote, reversed. For reasons that follow, we reverse the judgment of the Court of Appeals.

Each of the elements combined in the patent was known in the prior art. It is urged that the distinctive feature of the patent was the element of a radiant-heat burner. But it seems to be conceded that the burner, by itself, was not patentable. And so we reach the question whether the combination of the old elements created a valid combination patent.

[***LEdHR3A] [3A]The District Court said: "All that plaintiff [respondent] has done is to construct four elements known in the prior art on one chassis." That is relevant to commercial success, not to invention. The experts tendered by respondent testified that they had been doubtful that radiant heat would solve the problem of [56] the cold joint.¹ But radiant heat was old in the art. The question of invention must turn on whether the combination supplied the key requirement. We conclude that the combination was reasonably obvious to one with ordinary skill in the art.

1 Mr. Francis C. Witkoski, an engineer, met the inventor, Charles Neville, between 1955 and 1960 while Witkoski was Director of Research for the Pennsylvania Department of Highways. Neville told Witkoski that he had invented a piece of equipment that would heat but not burn asphalt, and would thus eliminate cold joints. Witkoski replied that he did not believe that Neville had such a piece of equipment. Subsequently, Witkoski ordered from Neville some of the separate burner units and tested them. Thus the dialogue between Witkoski and Neville focused exclusively on the properties of the radiant-heat burner.

Mr. Leslie B. Crowley, also an engineer, met Neville prior to 1954. Crowley was at that time the Chief of the Pavements and Railroads Section, Director of Installations, Headquarters, United States Air Force. Neville explained the advantages of using an "infra-red" heater for the maintenance and repair of asphalt pavements. Crowley testified that his interest was insufficient at that time to motivate him to take any action with regard to the device because he did not

believe it would "do the job." Thus the Crowley-Neville discussion also focused entirely on the radiant-heat burner, and not on the combination of the burner with the other elements of a bituminous paver.

There is uncontested evidence that the presence of the radiant-heat burner in the same machine with the other elements is not critical or essential to the functioning of the radiant-heat burner in curing the problem of the cold joint. For it appears that a radiant-heat burner operating in a tandem fashion would work as well. The combination of putting the burner together with the other elements in one machine, though perhaps a matter of great convenience, did not produce a "new or different function." *Lincoln Co. v. Stewart-Warner Corp.*, 303 U.S. 545, 549, [**308] without the test of validity of combination patents.

[*61] A combination of elements may result in an effect greater than the sum of the several effects taken separately. No such synergistic result is argued here. It is, however, fervently argued that the combination filled a long felt want and has enjoyed commercial success. [***262] But those matters "without invention will not make patentability." *A. & P. Tea Co. v. Supermarket Corp.*, 340 U.S. 147, 153.

[***LEdHR4] [4] [***LEdHR5] [5] The patent standard is basically constitutional, Article I, § 8, of the Constitution authorizing Congress "to promote the Progress of . . . useful Arts" by allowing inventors monopolies for limited times. We stated in *Graham v. John Deere Co.*, 383 U.S. 1, 6, that under that power Congress may not "enlarge the patent monopoly without regard to the innovation, advancement or social benefit gained thereby. Moreover, Congress may not authorize the issuance of patents whose effects are to remove existent knowledge from the public domain, or to restrict free access to materials already available. Innovation, advancement, and things which add to the sum of useful knowledge are inherent requisites in a patent system which by constitutional command must 'promote the Progress of . . . useful Arts.' This is the *standard* expressed in the Constitution and it may not be ignored."

In this case the question of patentability of the combination turns on the meaning of 35 U. S. C. § 103² which [*62] the Court reviewed in the *Graham* case, *supra*, at 13-17. We said:

"We believe that this legislative history, as well as other sources, shows that the revision was not intended by Congress to change the general level of patentable invention. We conclude that the section was intended merely as a codification of judicial precedents embracing the *Hotchkiss*³ condition, with congressional directions that inquiries into the obviousness of the subject matter sought to be patented are a prerequisite to patentability." *Id.*, at 17.

2 35 U. S. C. § 103 provides:

"A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made."

3 *Hotchkiss v. Greenwood*, 11 How. 248.

[***LEdHR6] [6] Obviousness, as an issue, is resolved as follows:

"Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved." *Ibid.*

We admonished that "strict observance" of those requirements is necessary. *Id.*, at 18.

[***LEdHR3B] [3B] We conclude that while the combination of old elements performed a useful function, 4 it added nothing to the nature and quality of the radiant-heat [***309] burner already patented. We conclude further that [***263] to those skilled in the art the use of the old elements in combination [*63] was not an invention by the obvious-nonobvious standard. Use of the radiant-heat burner in this important field marked a successful venture. But as noted, more than that is needed for invention.

4 35 U. S. C. § 101 provides:

"Whoever invents or discovers any new and useful process, machine, manufacture, or

396 U.S. 57, *63; 90 S. Ct. 305, **309;
24 L. Ed. 2d 258, ***263; 1969 U.S. LEXIS 3322

composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title."

Absent here is the element "new." For as we have said, the combination patent added nothing to the inherent characteristics or function of the radiant-heat burner.

Reversed.

THE CHIEF JUSTICE took no part in the decision of this case.

REFERENCES

Am Jur, Patents (1st ed 19, 32, 57-60)

15 Am Jur Pl & Pr Forms, Patents, Form 15:827

US L Ed Digest, Patents 19.1, 40, 64

ALR Digests, Patents 9, 10

L Ed Index to Anno, Patents

ALR Quick Index, Patents

Federal Quick Index, Patents

LEXSEE 770 F.2D 1031

**CABLE ELECTRIC PRODUCTS, INC., Appellant v. GENMARK, INC., a/k/a
DIABLO PRODUCTS CORP., Appellee**

No. 84-1412

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

770 F.2d 1015; 1985 U.S. App. LEXIS 15064; 226 U.S.P.Q. (BNA) 881

August 9, 1985

PRIOR HISTORY: [**1]

Appealed from: U.S. District Court for the District of California.

COUNSEL:

Paul J. Sutton, of New York, New York, argued for Appellant. With him on the brief was Barry G. Magidoff and Anthony Amaral, Jr.

Alan H. MacPherson, Skjerven, Morrill, MacPherson, Franklin & Friel, of San Francisco, California, argued for Appellee. With him on the brief were Thomas J. Friel, Jr. and Doniel E. Weil.

JUDGES:

Bennett, Circuit Judge, Miller, Senior Circuit Judge, * and Smith, Circuit Judge.

* The Honorable Jack R. Miller assumed senior status effective June 6, 1985.

OPINION BY:

BENNETT

OPINION:

[*1018] BENNETT, Circuit Judge.

I. BACKGROUND

This is an appeal from the United States District

Court for the Northern District of California n1 which through its grants of summary judgment favorable to defendant Genmark, Inc. (Genmark), on February 29, 1984, n2 and May 25, 1984, n3 rendered a final judgment in Civil Docket No. C-83-0897-WWS, an action for patent infringement, federal false designation of origin, state unfair competition, and state trademark infringement.

n1 The Honorable William W. Schwarzer, District Judge.

[**2]

n2 582 F. Supp. 93, 223 U.S.P.Q. (BNA) 287.

n3 586 F. Supp. 1505, 223 U.S.P.Q. (BNA) 291.

The original complaint in this action was filed February 25, 1983, and accused Genmark of infringement of United States Patent No. 4,343,032 issued to Frederic W. Schwartz (the Schwartz patent) and owned by plaintiff Cable Electric Products, Inc. (Cable). The Schwartz patent relates to a photosensitive electric lamp able to turn itself on by degree as ambient light diminishes. As illustrated in Fig. 1 from the Schwartz patent, appearing below with unnecessary reference characters omitted, such a lamp includes a housing 10 which supports a light bulb 18 enclosed by a removable translucent shade 24. A lens 12 on the front of housing 10 permits ambient light to reach electrical circuitry and effect the operation described above. The device obtains

power from a conventional electric wall receptacle through a pair of contact blades 14 at the rear of housing 10.

[SEE ILLUSTRATION IN ORIGINAL]

On October 11, 1983, Genmark filed a first motion for summary judgment. [*3] The following day Cable moved for leave to amend its complaint to include, in addition to the patent count already joined, three others not based on any patent. The requested [*1019] leave to amend was granted November 17, 1983. Subsequently, Genmark's first motion for summary judgment as to the patent count was granted. Thereafter, on April 24, 1984, Genmark made a second motion for summary judgment, this time as to the three counts added to the litigation by the amended complaint. The second motion was also granted, and the present appeal resulted.

We affirm the grant of summary judgment as to the patent infringement count, vacate the grant of summary judgment as to the nonpatent counts, and remand these for further appropriate deliberations.

The judgments will be reviewed below in the order granted. n4

n4 The discussion to follow can be summarized in outline form, which for the convenience of the reader is provided below:

I. BACKGROUND

II. THE PATENT COUNT

A. Summary Judgment

B. Harmful Error

C. Burdens of Proof

D. Prior Art

E. Hodgetts Declaration

F. Secondary Factors

1. Commercial Success
2. Product Copying

G. Disposition

III. THE NONPATENT COUNTS

A. Lanham Act

B. State Causes of Action

1. Choice of Law
2. Preemption
3. Disposition

IV. CONCLUSION

APPENDIX

[**4]

II. THE PATENT COUNT

The district court dealt with the Genmark motion for summary judgment on the patent infringement count of the original complaint of Cable Electric in a Memorandum of Opinion and Order dated February 29, 1984 (the patent opinion). n5 There it stated, "The Court finds that, although defendant cannot establish that its device does not infringe plaintiff's patent, defendant does meet its burden of proof in establishing the obviousness of plaintiff's claimed invention under 35 U.S.C. § 103 without raising a genuine dispute of material fact." The Genmark motion was accordingly granted, and the Schwartz patent invalidated.

n5 See *supra* note 2.

Cable Electric attacks that judgment scattershot fashion with a laundry list of objections which fall into the two general areas of inquiry suggested by *Fed. R. Civ. P. 56(c)*, n6 namely, (1) the existence of genuine issues of material fact and (2) the entitlement of the movant to judgment as a matter of law. In the former [*5] category, it is asserted that the obviousness standard used by the district court evidences a level of uncertainty which implies the existence of genuine issues of material fact, and that affidavits or deposition testimony submitted in opposition to the summary judgment motion raise contested issues of material fact with regard to the scope and content of the prior art, the differences between that art and the claims at issue, the commercial success of the product embodying those claims, and the copying of that product by Genmark as demonstrating nonobviousness. It

is asserted that the evidence on these issues was not viewed in a light most favorable to Cable, the opponent of summary judgment.

n6 *Fed. R. Civ. P. 56(c)* states in relevant part:

"The judgment sought shall be rendered forthwith if the pleadings, depositions, answers to interrogatories, and admissions on file, together with the affidavits, if any, show that there is no genuine issue as to any material fact and that the moving party is entitled to a judgment as a matter of law."

[**6]

Regarding the law employed, Cable contends that the district court erred in that it shifted the burden of persuasion on invalidity, failed to determine that the art relied on to invalidate the Schwartz patent was more pertinent than that considered during prosecution, did not specifically indicate the combination of teachings that would yield the claimed invention, gave inadequate consideration to commercial success and copying as secondary indicia of nonobviousness, and applied an incorrect obviousness standard, which included, among other alleged [*1020] deficiencies, a failure to consider the claimed invention as a whole.

We find these assertions individually and collectively to be without merit. The patent opinion of the district court is well reasoned and, in light of the record upon which it is based, adequate, accurate, and amply justified. The following discussion substantiates our conclusion.

A. Summary Judgment

Some comments on the use and appellate review of summary judgment are required to provide a frame of reference for a discussion of the record.

A number of objections by Cable are essentially complaints that the district court did not adequately [*7] amplify its reasoning and the underlying factual inferences on which it relied in granting summary judgment. *Fed. R. Civ. P. 56(c)*, however, makes it clear that the circumstances in which a grant of summary judgment is proper are circumstances in which a district

court need not function as an arbiter among differing versions of every factual reality for which evidentiary support has been presented. Instead, the circumstances appropriate to summary judgment are those in which a district court is able to conclude that, with regard to any factual issues material to granting judgment as a matter of law, no genuine dispute exists. Thus, it manifests incorrect expectations to fault a district court in granting summary judgment for a failure to find particular facts. To engage in fact finding would be not only inappropriate, but would per se imply the impropriety of the grant. See *Leimelson v. TRW, Inc.*, 760 F.2d 1254, 1260-61, 225 U.S.P.Q. (BNA) 697, 700-01 (*Fed. Cir.* 1985).

Additionally, [*8] although *Fed. R. Civ. P. 52(a)* provides that a "court shall find the facts specially and state separately its conclusions of law thereon," the rule contains the pertinent qualification that "findings of fact and conclusions of law are unnecessary on decisions of motions under Rules 12 or 56." *Accord Helena Rubinstein, Inc. v. Bau*, 433 F.2d 1021, 1024, 167 U.S.P.Q. (BNA) 711, 713 (9th Cir. 1970); *Fromberg, Inc. v. Gross Manufacturing Co.*, 328 F.2d 803, 806, 140 U.S.P.Q. (BNA) 641, 643 (9th Cir. 1964). An exception, which we do not consider to be applicable here, can be found in *Fed. R. Civ. P. 56* in the case of grants of partial summary judgment. n7 Assuredly, to know the reasoning a district court used in deciding to grant summary judgment facilitates the task of a reviewing court, and there does exist a risk in complicated cases of an unnecessary reversal if the logic that resulted in a grant of summary judgment cannot be discerned. See *Petersen Manufacturing Co. v. Central Purchasing, Inc.*, 740 F.2d 1541, 1546, 222 U.S.P.Q. (BNA) 562, 566 (*Fed. Cir.* 1984). Nevertheless, in light of the record before us and the patent opinion of [*9] the district court, the issues in this case present no such degree of complexity as would preclude affirmance, due to any failure of the district court to make the basis of its holding clear.

n7 *Fed. R. Civ. P. 56(d)* states:

"Case Not Fully Adjudicated on Motion. If on motion under this rule judgment is not rendered upon the whole case or for all the relief asked and a trial is necessary, the court at the hearing of the motion, by examining the pleadings and the evidence before it and by interrogating counsel, shall if practicable ascertain what material facts

exist without substantial controversy and what material facts are actually and in good faith controverted. It shall thereupon make an order specifying the facts that appear without substantial controversy, including the extent to which the amount of damages or other relief is not in controversy, and directing such further proceedings in the action as are just. Upon the trial of the action the facts so specified shall be deemed established, and the trial shall be conducted accordingly."

While the patent decision of the district court did not immediately dispose of "the whole case" brought by Cable, within 3 months a second order of summary judgment had decided the balance of the case. Consequently, no trial has proved necessary. As both summary judgment orders are before us in this appeal, and as the parties have not premised any arguments upon the fact that the initial, patent opinion was "not rendered upon the whole case," we view the exception of *Fed. R. Civ. P. 56(d)* as not applicable in any way here to increase the duty of the district court to find facts specially.

[**10]

Thus, the complaint of Cable as to the insufficiency of "the factual findings of the [*1021] District Court on the scope and content of the prior art [or] . . . the differences between the prior art and the claims at issue" is unpersuasive for at least three reasons. First, the presence of findings would signal the possible existence of disputed issues of material fact, none of which we discern to exist. Second, there is no legal requirement that the rationale behind a nonpartial grant of summary judgment, including a recitation of undisputed factual inferences and applications of legal principles, be made explicit. The only requirement in this regard is pragmatic, with an eye toward judicial economy and communication with the litigants. Finally, in this instance, the premise underlying the argument is simply incorrect. Contrary to the hyperbole of Cable, the patent opinion of the district court evidences that it considered and, in view of the straightforward nature of this case, adequately discussed the issues involved.

On this basis, we also dispose of the charge by Cable [**11] that the district court "failed to make a factual

determination as to whether any of these [prior art patent] references were or were not more pertinent than the art considered by the Patent and Trademark Office during the prosecution of the patent-in-suit." Cable cites *Jones v. Hardy*, 727 F.2d 1524, 1529, 220 U.S.P.Q. (BNA) 1021, 1025 (Fed. Cir. 1984), as condemning the omission of such a determination. Nevertheless, in *Jones* the appeal was from a judgment rendered after a 2-day trial, rather than one from summary judgment, and the failure of the lower court opinion to contain a *factual* determination as to pertinency was but one of many, more major flaws in the obviousness analysis cited by this court in reversing a conclusion of invalidity. The analysis faulted in *Jones* included, for example, a denial of the "statutory presumption of validity and an impermissible burden-shifting," *id.*, which, as will be discussed below, did not occur here. Cf. *King Instrument Corp. v. Otari Corp.*, 767 F.2d 853, 226 U.S.P.Q. (BNA) 402, 404 (Fed. Cir. 1985) (referring to the failings in the *Jones* analysis as a "parade of horrors"). [**12] A determination on pertinency may in some cases afford insight into the reasoning of the factfinder, but it is not strictly a requirement under *Graham v. John Deere Co.*, 383 U.S. 1, 148 U.S.P.Q. (BNA) 459, 15 L. Ed. 2d 545, 86 S. Ct. 684 (1966), for a proper obviousness analysis.

Review of the grant of summary judgment at issue then first requires review of the evidence relevant to the factual inquiries of *Graham*, including evidence relevant to the secondary considerations, in order to determine whether any genuine issue exists as to facts material to reaching a conclusion on obviousness. *Cooper v. Ford Motor Co.*, 748 F.2d 677, 679, 223 U.S.P.Q. (BNA) 1286, 1287-88 (Fed. Cir. 1984). If not, and if viewing that evidence in a light most favorable to the nonmovant and drawing in favor thereof all inferences as are reasonable, the moving party is entitled to judgment as a matter of law, the grant of summary judgment will be affirmed. *Id.* at 679, 223 U.S.P.Q. at 1288. [**13]

B. Harmful Error

In such analysis as Cable is willing to acknowledge was included by the district court in its patent opinion, several errors are alleged. Nevertheless, as obviousness under 35 U.S.C. § 103 (1982) is a conclusion of law subject to our full and independent review, *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 1344, 220 U.S.P.Q. (BNA) 777, 782 (Fed. Cir.) (in banc), cert. denied, 469 U.S. 830, 105 S. Ct. 116, 225 U.S.P.Q. (BNA) 232, 83 L.

Ed. 2d 60 (1984), reversal in this instance would require more than a mere demonstration of error in analysis. Even assuming that such errors were committed, Cable must demonstrate that if the errors were corrected, the application of the law to the facts present would produce a different result. *Union Carbide Corp. v. American Can Co.*, 724 F.2d 1567, 1573, 220 U.S.P.Q. (BNA) 584, 589 (Fed. Cir. 1984). In short, such errors as may be demonstrated must have further been harmful. See 28 U.S.C. [*1022] § 2111. n8 Accord [*14] *Richdel, Inc. v. Sunspool Corp.*, 714 F.2d 1573, 1580, 219 U.S.P.Q. (BNA) 8, 12 (Fed. Cir. 1983).

n8 28 U.S.C. § 2111 (1982) reads as follows:

"Harmless error. On the hearing of any appeal or writ of certiorari in any case, the court shall give judgment after an examination of the record without regard to errors or defects which do not affect the substantial rights of the parties."

C. Burdens of Proof

The burdens of demonstrating the absence of genuine issues of material fact and the entitlement to judgment as a matter of law is upon the summary judgment movant, *Genmark*. *Cooper*, 748 F.2d at 679, 223 U.S.P.Q. at 1288. In this instance, as *Genmark* is also the party asserting the invalidity of a United States patent, the burden of demonstrating an entitlement [*15] to judgment as a matter of law includes the burden of overcoming the presumption of patent validity found in 35 U.S.C. § 282. n9 Cable claims that, despite explicit mention by the district court, the presumption of validity was not observed. The presumption of section 282 is "a procedural device which places on a party asserting invalidity the initial burden of going forward to establish a prima facie case on that issue." *Lear Siegler, Inc. v. Aeroquip Corp.*, 733 F.2d 881, 885, 221 U.S.P.Q. (BNA) 1025, 1028 (Fed. Cir. 1984). While "the burden of persuasion on the issue of invalidity also rests throughout the litigation with the party asserting invalidity," *id.*, if evidence is presented establishing a prima facie case of invalidity, the opponent of invalidity must come forward with evidence to counter the prima facie challenge to the presumption of section 282. This requirement is in no way contrary to the procedural role of the presumption of validity. Nor does it in substance shift the burden of persuasion on the issue. "In the end, the [*16] question

is whether all the evidence establishes that the validity challenger so carried his burden as to have persuaded the decisionmaker that the patent can no longer be accepted as valid." *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1534, 218 U.S.P.Q. 871, 876 (Fed. Cir. 1983).

n9 35 U.S.C. § 282 (1982) contains the following first paragraph:

"Presumption of validity; defenses

"A patent shall be presumed valid. Each claim of a patent (whether in independent, dependent, or multiple dependent form) shall be presumed valid independently of the validity of other claims; dependent or multiple dependent claims shall be presumed valid even though dependent upon an invalid claim. The burden of establishing invalidity of a patent or any claim thereof shall rest on the party asserting such invalidity."

Likewise, [*17] on a motion for summary judgment, the burden is upon the movant in support thereof to demonstrate an absence of genuine issues of material fact and then the entitlement to judgment at law. *Fed. R. Civ. P. 56(c)*. n10 If a showing is made that would entitle the movant to judgment unless contradicted, then *Fed. R. Civ. P. 56(e)* n11 states that the nonmovant has the burden to show that such a contradiction is possible; it cannot rest upon its allegations and pleadings. *First National Bank v. First Bank Stock Co.*, 306 F.2d 937, 943 (9th Cir. 1962). Indeed, this "shift of burden and the duty to come forward with possible contradiction of proof is the essence of *Fed. R. Civ. P. 56*." *DeLong Corp. v. Raymond International, Inc.*, 622 F.2d 1135, 1144, 206 U.S.P.Q. (BNA) 97, 104 (3d Cir. 1980) (cited and quoted in part in *D. L. Auld Co. v. Chroma Graphics Corp.*, 714 F.2d 1144, 1150, 219 U.S.P.Q. (BNA) 13, 17-18 (Fed. Cir. 1983)). Here, once *Genmark* had established its prima facie case for summary judgment, which would have included a prima facie case for overcoming the presumption of validity, it fell upon Cable to submit evidence setting [*18] forth specific facts raising [*1023] a genuine issue for trial. *First National Bank v. Cities Service Co.*, 391 U.S. 253, 289, 20 L. Ed. 2d 569, 88 S. Ct. 1575, *reh'g denied*, 393 U.S. 901, 89 S. Ct. 63, 21 L. Ed. 2d 188 (1968). This Cable clearly understood

when it submitted, in opposition to the summary judgment motion of Genmark, deposition testimony and various declarations which it contended raised genuine issues of material fact relative to an obviousness analysis under *Graham*. In commenting on the effectiveness of one of these declarations in presenting evidence of factual issues requiring trial, the district court said "plaintiff [Cable] seeks to avoid summary judgment by introducing the declaration of an expert that, it claims, raises genuine issues of material fact." 582 F. Supp. at 97, 223 U.S.P.Q. at 291. It is now contended that the "avoid summary judgment" phrase of this statement demonstrates that the district court improperly shifted to Cable, the patentee, the burden of persuasion on the issue of invalidity. We disagree.

n10 See *supra* note 6.

[**19]

n11 *Fed. R. Civ. P. 56(e)* states in relevant part:

"When a motion for summary judgment is made and supported as provided in this rule, an adverse party may not rest upon the mere allegations or denials of his pleading, but his response, by affidavits or as otherwise provided in this rule, must set forth specific facts showing that there is a genuine issue for trial. If he does not so respond, summary judgment, if appropriate, shall be entered against him."

For reasons to be discussed below, and with which we concur, the district court deemed the affidavits submitted by Cable to have been inadequate to show any genuinely contested issues of material fact. Thus, Cable failed in the duty imposed upon it by *Fed. R. Civ. P. 56(e)* to rebut the *prima facie* case for summary judgment by showing "that there is a genuine [factual] issue for trial." Contrary to the argument of Cable, this duty is distinct from that of "requiring that the evidence 'persuade' the court of patentability," which was condemned [**20] in *Jones v. Hardy*, 727 F.2d at 1528, 220 U.S.P.Q. at 1025. The avoidance of summary judgment as to patent invalidity does not represent a shift of the burden of going forward to establish a case for invalidity or the burden of persuasion on the issue of

invalidity. Under section 282 these burdens were imposed on Genmark, and we have not been given the impression that the district court shifted them to Cable. The stray and inconsequential quotations proffered in this regard from the summary judgment hearing add nothing to the meritless claim that the presumption of validity was not observed.

D. Prior Art

The district court opinion invalidating the Schwartz patent mentions a number of prior art patent references. Among these, U.S. Patent No. 3,968,355 to Smallegan (the Smallegan patent) discloses a night light controlled by a photosensitive switch and operated from an electric wall receptacle. It is undisputed that this reference alone teaches all of the limitations in the claims of the Schwartz patent, save those pertaining to what is termed in claim 1 thereof n12 "a shade of predetermined shape and appearance." In this regard, however, the Smallegan patent [**21] does contain a specific suggestion for providing some sort of shade about the bulb of the device to reduce the effect of the bulb on the photosensitive control, and other references discussed below exhibit the shade details recited in the patent in suit.

n12 Claim 1, the sole independent claim of the three claims in the Schwartz patent, is included by way of illustration in the Appendix to this opinion.

For example, U.S. Patent No. 3,694,607 to Fontana and U.S. Patent No. Des. 205,371 to Mellyn, from which Fig. 3 is included here, disclose bottom-mounted night light shades which "frictionally engage and disengage in a snap-on manner . . . said [lamp] housing in a position . . . facilitating repeated replacement of said bulb," as is recited in claim 1 of the Schwartz patent.

[SEE ILLUSTRATION IN ORIGINAL]

Additionally, U.S. Patents Nos. Des. 207,500 and Des. 208,939, both also to Mellyn, show such shades having "front and side [*1024] wall portions." Figs. 1 and 2 of the latter patent [**22] are included below and depict a shade fully described by the following limitation from claim 1 of the patent in suit:

Said front wall portion [has] a generally planar surface extending between generally rectangular edges including longer vertically extending edges and relatively shorter horizontally extending edges, said side wall portions extending in a diverging manner generally symmetrically at a predetermined angle greater than 90 degrees away from said front wall portion toward a rearward plane of said [lamp] housing. . . ."

All of these references are from the electric night light art, the same as that of the patent in suit and of the Smallegan patent. Based on the explicit suggestions for a shade contained in the latter, teachings of these references could have been combined to produce a device meeting all the limitations of claim 1 of Schwartz except for having "a generally polygonal-shaped pattern extending over substantially the entire front wall portion" of the shade.

This feature, however, can be found in the following patents among those mentioned by the district court as examples of such a teaching:

[SEE ILLUSTRATION IN ORIGINAL]

U.S. Patent No.	Patentee
-----------------	----------

Des. 127,892	Ohm
--------------	-----

3,549,879	Meyer
-----------	-------

3,265,887	Wince
-----------	-------

2,978,575	Cohen
-----------	-------

[**23]

None of these deal with shades for night lights specifically, but rather with shades for overhead lighting fixtures. Cable argues that these would use florescent light bulbs in contrast to the incandescent-type employed with the night light of the Schwartz patent. The declaration of 33-year Cable employee, Harry Hodgetts, head of the company's design engineering department (the Hodgetts declaration), attempts to puff up the difference between the two types of light bulbs as presenting "entirely different light diffusing problems," but fails absolutely to elaborate the nature of the purported differences. Such unsupported conclusional statements are not helpful in affidavits used to "avoid summary judgment."

The references demonstrate that polygonal patterning on light shades was old in the lighting art, even if not in the narrow field of night lights. Each reference addresses a problem confronted by the Schwartz patent, namely, the diffusion of light from an electric bulb, be it incandescent or florescent, through a translucent [*1025] shade. In evaluating obviousness, the [*24] hypothetical person

of ordinary skill in the pertinent art is presumed to have the "ability to select and utilize knowledge from other arts reasonably pertinent to [the] particular problem" to which the claimed invention is directed. *In re Antle*, 58 C.C.P.A. 1382, 444 F.2d 1168, 1171-72, 170 U.S.P.Q. (BNA) 285, 287-88 (1971); see, e.g., *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 1460, 221 U.S.P.Q. (BNA) 481, 487 (Fed. Cir. 1984). Assuming arguendo that these four references are not strictly within the field of art represented by Schwartz, they are easily within a field analogous thereto, and their teachings are properly combinable with the earlier references discussed above. See *Union Carbide Corp. v. American Can Co.*, 724 F.2d 1567, 1572, 220 U.S.P.Q. (BNA) 584, 588 (Fed. Cir. 1984) (quoting *In re Wood*, 599 F.2d 1032, 1036, 202 U.S.P.Q. (BNA) 171, 174 (CCPA 1979)).

Cable faults the district court for failing to make determinations as to how teachings of the references could be combined to produce the patented invention. Nevertheless, the straight-forward quality of the [*25] invention and art involved make the required combination quite apparent. The district court pointed

out features in each reference; presumably it was these that were to be joined. As to most teachings, several references were cited without delineating a single one of the group for combination with references showing other features. The district court did so apparently to demonstrate the widespread knowledge in the lighting art of each feature involved. As no serious ambiguity resulted, we observe no error in this.

Further, the suggestion to modify the art to produce the claimed invention need not be expressly stated in one or all of the references used to show obviousness. "Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art." *In re Keller*, 642 F.2d 413, 425, 208 U.S.P.Q. (BNA) 871, 881 (CCPA 1981) (and cases cited therein); *Leinoff v. Louis Milona & Sons, Inc.*, 726 F.2d 734, 739, 220 U.S.P.Q. (BNA) 845, 848-49 (Fed. Cir. 1984). The district court in invalidating the Schwartz [*26] patent relied exclusively and correctly on "knowledge clearly present in the prior art." *In re Semaker*, 702 F.2d 989, 995, 217 U.S.P.Q. (BNA) 1, 6 (Fed. Cir. 1983). In this respect it is to be sustained.

E. Hodgetts Declaration

Cable claims that the Hodgetts declaration, if viewed "in a light most favorable" to Cable, raises genuine issues of material fact in relation to the inquiries required by *Graham* dealing with scope and content of the prior art and the differences between that art and the claims at issue. With respect to the references discussed above, the declaration adds little, if anything, not already in the record. While attempting to highlight differences between the teachings of the references and the claimed invention, it largely summarizes their contents and is thus duplicative in a manner which fails to demonstrate any genuine dispute as to issues of material fact and is not helpful in resolving patentability problems. "What we do find helpful is facts of which we would not otherwise be aware." *In re Vamco Machine & Tool, Inc.*, 752 F.2d 1564, 1576, 224 U.S.P.Q. (BNA) 617, 624 (Fed. Cir. 1985). [*27]

The declaration states the opinion that "the patented invention of the Schwartz patent . . . [would] not [have been] obvious to one of ordinary skill in the night light art" from the teachings of the references discussed. Obviousness, however, is a question of law.

Opinion testimony by experts concluding that an invention would or would not have been obvious may influence the court's decision, but conflicting opinions on a legal issue vel non raise no issue of contested fact. Nor is the court's conclusion on obviousness an adverse inference of fact.

Petersen Manufacturing Co. v. Central Purchasing, Inc., 740 F.2d 1541, 1548, 222 U.S.P.Q. (BNA) 562, 567 (Fed. Cir. 1984) (citations omitted).

[*1026] We reject the contention that the Hodgetts declaration raised contested issues of fact. At most, the declaration offered an interpretation of undisputed factual evidence, but did not set forth specific conflicting facts that showed a genuine issue requiring trial.

F. Secondary Factors

[**28] In making a determination on obviousness under 35 U.S.C. § 103, *Graham v. John Deere Co.*, 383 U.S. at 17, 148 U.S.P.Q. at 467, sets forth, as providing "background," "several basic factual inquiries," including the content of the prior art, the difference between that art and the claimed subject matter, and the level of ordinary skill in the subject art. In addition, it is suggested that certain "secondary considerations" which "give light to the circumstances surrounding the origin of the [patented] subject matter" may have relevancy as "indicia of obviousness or nonobviousness." *Id.* at 17-18, 148 U.S.P.Q. at 467. The opinions of this court have suggested that evidence on these secondary considerations is to be taken into account *always*, "not just when the decisionmaker remains in doubt after reviewing the art." *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1539, 218 U.S.P.Q. (BNA) 871, 879 (Fed. Cir. 1983). See *Simmons Fastener Corp. v. Illinois Tool Works, Inc.*, 739 F.2d 1573, 1575, 222 U.S.P.Q. (BNA) 744, 746 (Fed. Cir. 1984). [*29] *cert. denied*, 471 U.S. 1065, 105 S. Ct. 2138, 85 L. Ed. 2d 496 (1985); *Radio Steel & Manufacturing Co. v. MTD Products, Inc.*, 731 F.2d 840, 846, 221 U.S.P.Q. (BNA) 657, 662 (Fed. Cir.), *cert. denied*, 469 U.S. 831, 105 S. Ct. 119, 83 L. Ed. 2d 62 (1984); *Jones v. Hardy*, 727 F.2d at 1530, 220 U.S.P.Q. at 1027; *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 1549, 220 U.S.P.Q. (BNA) 193, 197 (Fed. Cir. 1983).

Nevertheless, a "nexus between the merits of the claimed invention and the evidence of secondary considerations is required in order for the evidence to be given substantial significance in an obviousness decision." *Simmons Fastener*, 739 F.2d at 1575, 222 U.S.P.Q. at 746; *Stratoflex*, 713 F.2d at 1539, 218 U.S.P.Q. at 879. Thus, the weight to be accorded evidence on secondary considerations is to be carefully appraised in relation to the facts of the actual case in which it is offered. See *EWP Corp. v. Reliance Universal, Inc.*, 755 F.2d 898, 908, 225 U.S.P.Q. (BNA) 20, 26 (Fed. Cir. 1985); *In re Vamco Machine & Tool, Inc.*, 752 F.2d 1564, 1574-77, 224 U.S.P.Q. 617, 623-25 (Fed. Cir. 1985); [*30] see also Address by D. Chisum, AIPLA Annual Meeting (October 26, 1984), reprinted in 1984 AIPLA Bull. 618, 620 ("secondary not because they are secondary in importance [but] . . . because they are relevant through a process of inference to the ultimate technical issue of nonobviousness [and being] . . . relevant through a chain of inference, their force may be weakened for a variety of reasons").

Cable claims that a trial is required due to the existence of contested issues of material fact regarding (1) the commercial success of the Cable device embodying the claims of the Schwartz patent and (2) the copying of that device by Genmark.

1. Commercial Success.

Cable relies on the declaration of its chief financial officer, George Lema, executed October 31, 1982 (the Lema declaration). Relevant to this issue, it states only the following:

Plaintiff [Cable] began manufacturing its night light in 1978. Since the introduction of that night light, over 5 million units have been sold. Profits of not less than fifty (\$.50) cents per unit have been realized by plaintiff. Plaintiff's night light has been distributed nationwide in major department store chains [*31] and local hardware outlets.

Genmark has not disputed this statement, so it is to be accepted for what it shows. *Union Carbide*, 724 F.2d 1567 at , 220 U.S.P.Q. at 591.

Nevertheless, what it shows in relation to commercial success is fairly minimal. Without further economic evidence, for example, it would be improper to infer that the reported sales represent a substantial share of any definable market or whether [*1027] the profitability per unit is anything out of the ordinary in the industry involved. This type of information might bolster the existence in fact of any commercial success which may be demonstrated by the Lema declaration, but even assuming commercial success were clearly shown, Cable would face an additional hurdle before the Lema declaration could prove pertinent to nonobviousness.

As the district court correctly pointed out in declining to give weight to the Lema declaration on the issue of commercial success as an indicator of nonobviousness, this court in *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 218 U.S.P.Q. (BNA) 871 (Fed. Cir. 1983), has unequivocally stated that [*32] for commercial success of a product embodying a claimed invention to have true relevance to the issue of nonobviousness, that success must be shown to have in some way been due to the nature of the claimed invention, as opposed to other economic and commercial factors unrelated to the technical quality of the patented subject matter. Thus, a "nexus is required between the merits of the claimed invention and the evidence offered, if that evidence is to be given substantial weight enroute to [a] conclusion on the obviousness issue." *Id.* at 1539, 218 U.S.P.Q. at 879. *Accord EWP Corp. v. Reliance Universal, Inc.*, 755 F.2d 898, 908, 225 U.S.P.Q. (BNA) 20, 26 (Fed. Cir. 1985) ("a 'secondary consideration' must be carefully appraised as to its evidentiary value"); *Simmons Fastener Corp. v. Illinois Tool Works, Inc.*, 739 F.2d 1573, 1575, 222 U.S.P.Q. (BNA) 744, 746 (Fed. Cir. 1984), cert. denied, 471 U.S. 1065, 105 S. Ct. 2138, 85 L. Ed. 2d 496 (1985); *In re Vamco Machine & Tool, Inc.*, 752 F.2d 1564, 1577, 224 U.S.P.Q. (BNA) 617, 625 (Fed. Cir. 1985); [*33] see also *Ruben Condenser Co. v. Aerovox Corp.*, 77 F.2d 266, 268 (2d Cir.), cert. denied, 296 U.S. 623, 56 S. Ct. 145, 80 L. Ed. 443 (1935) (where Judge Learned Hand stated, "While it is always the safest course to test a putative invention by what went before and what came after, it is easy to be misled. Nothing is less reliable than uncritically to accept its welcome by the art, even though it displace[s] what went before"). Viewed in a light most favorable to Cable, from the Lema declaration an inference of some commercial success might be deduced, but as to establishing any "nexus" between that hypothetical success and "the merits of the

claimed invention," no evidence was submitted in the declaration or elsewhere that could justify giving weight to the declaration in reaching a conclusion on obviousness. After considering the Lema declaration the district court correctly determined to accord it no weight.

2. Product Copying.

Cable alleges that Genmark copied the Cable night light in designing the accused infringing device and that this alleged copying is evidence of nonobviousness of the Schwartz patent. The evidence in support [*34] of the charge of copying in designing the Genmark product is ambiguous, even viewed in a light favorable to Cable. Deposition testimony of Thomas E. Corder, president of Diablo Technologies, Inc., apparently a successor of Diablo Products Corp., was offered on this point, but Genmark's own characterization of the implication of this evidence was merely that it showed that Corder "had access to and analyzed the appearance of plaintiff's night light during the period he was developing the accused Diablo [later Genmark] night light." Access to, and analysis of, other products in the market is hardly rare, even in the design stages of competing devices. Access in combination with similarity can create a strong inference of copying, but here Cable, as noted by the district court, failed to submit into evidence a sample of its own device for comparative purposes in evaluating the extent of similarity.

The Lema declaration states that "defendant [Genmark] deliberately copied plaintiff's night light when it designed its own night light," but only on information and belief, which under *Fed. R. Civ. P. 56(e)* is an inadequate basis upon which to base affidavits supporting or opposing [*35] summary [*1028] judgment. n13 Thus, in this instance, product copying at the design stage would be a strained inference.

n13 *Fed. R. Civ. P. 56(e)* states in relevant part:

"Supporting and opposing affidavits shall be made on personal knowledge, shall set forth such facts as would be admissible in evidence, and shall show affirmatively that the affiant is competent to testify to the matters stated therein. Sworn or certified copies of all papers or parts thereof referred to in an affidavit shall be attached thereto or served therewith. The court may permit

affidavits to be supplemented or opposed by depositions, answers to interrogatories, or further affidavits."

Further, in pressing the relevance to nonobviousness of purported copying by Genmark, "as is often the case . . . [Cable] failed to distinguish infringement by a defendant from that of numerous other competitors." Note, *Subtests of "Nonobviousness"*: [*36] *A Nontechnical Approach to Patent Validity*, 112 U. Pa. L. Rev. 1169, 1179 n.51 (1964) (cited in *Graham v. John Deere Co.*, 383 U.S. 1, 18, 148 U.S.P.Q. (BNA) 459, 467, 15 L. Ed. 2d 545, 86 S. Ct. 684 (1966), as relevant to the decision of the Supreme Court to include secondary indicia in the prescribed obviousness determination). It is our conclusion that more than the mere fact of copying by an accused infringer is needed to make that action significant to a determination of the obviousness issue. *Accord Vandenberg v. Dairy Equipment Co.*, 740 F.2d 1560, 1567, 224 U.S.P.Q. (BNA) 195, 199 (Fed. Cir. 1984), where copying of a patented device, despite the failure of protracted efforts by the copyist to design a similar device, was found to be an admission of the mechanical superiority of the patented version, but "not strong evidence of nonobviousness." n14

n14 That is not to say that copying is always irrelevant in the context of other evidence of nonobviousness. See *Jones v. Hardy*, 727 F.2d 1524, 1531, 220 U.S.P.Q. (BNA) 1021, 1026-27 (Fed. Cir. 1984); *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1540, 1541, 218 U.S.P.Q. (BNA) 871, 880 (Fed. Cir. 1983).

[**37]

Rather than supporting a conclusion of obviousness, copying could have occurred out of a general lack of concern for patent property, in which case it weighs neither for nor against the nonobviousness of a specific patent. It may have occurred out of contempt for the specific patent in question, only arguably demonstrating obviousness, or for the ability or willingness of the patentee financially or otherwise to enforce the patent right, which would call for deeper inquiry. Even widespread copying could weigh toward opposite conclusions, depending on the attitudes existing toward patent property and the accepted practices in the industry in question. It is simplistic to assert that copying per se

should bolster the validity of a patent.

We do not concur in the reasoning evidenced by the statement of the district court that "it is just as likely that the similarity (assuming it exists) is more attributable to the simple obviousness of plaintiff's design rather than to defendant's deliberate mimicry." 582 F. Supp. at 97, 223 U.S.P.Q. at 290. The record simply offers nothing in this regard, and the speculation involved is unwarranted. Nevertheless, in view of Cable's [**38] poor showing as to copying and in view of the barrenness of the record on the "nexus" between any copying arguably shown and the nonobviousness of the claimed invention, it would have been improper to give the alleged copying by Genmark much weight in the obviousness analysis. Thus, the district court treated this issue appropriately, and its comment above as to the reason for copying, if any exists, is but harmless error.

G. Disposition

Based on a review of the record as discussed above, it is our conclusion that the patent portion of this case was properly resolved by a grant of summary judgment and that the Schwartz patent is invalid as being directed to obvious subject matter. We can discern no such genuinely disputed questions of fact material to such a judgment as would warrant a trial.

The art involved is easily grasped. The difference between the teaching of each reference and the claimed subject matter is clear, as is how those teachings are to be combined to yield the subject invention. [*1029] No issue has been raised about the level of skill employed in analysis, that of an ordinary layman of average intelligence and one in this case most favorable to [**39] Cable Electric. Cf. *Chore-Time Equipment, Inc. v. Cumberland*, 713 F.2d 774, 779 n.2, 218 U.S.P.Q. (BNA) 673, 676 n.2 (Fed. Cir. 1983). Secondary considerations for the reasons stated above have been given proper weight.

Cable raises objection to the statement of the district court that it "has no difficulty finding it more likely than not that . . . a shade of the type plaintiff claims . . . [is] an obvious solution" to the problem confronted by plaintiff. Naturally, a determination on the issue of obviousness is no "finding"; it is question of law. Nevertheless, this slip and the concomitant use of the phrase, "more likely than not," are but harmless rhetorical error. Elsewhere throughout the patent opinion the district court shows a

good understanding of the nature of and analysis associated with reaching a conclusion on obviousness. Nor do we agree with Cable that the district court either was "confused as to what the claimed invention in suit was" or failed to consider that invention as a whole.

III. THE NONPATENT COUNTS

The district court granted the Genmark motion for summary judgment as to the nonpatent counts of Cable's amended complaint in a [**40] second Memorandum of Opinion and Order dated May 25, 1984 (the second opinion). n15 As the district court ultimately exercised its jurisdiction over the patent count discussed above under the patent provision of 28 U.S.C. § 1338(a), n16 we have jurisdiction also to review the appeal of the remaining nonpatent counts under 28 U.S.C. § 1295(a). n17 *Bandag, Inc. v. Al Bolser's Tire Stores, Inc.*, 750 F.2d 903, 907-09, 223 U.S.P.Q. (BNA) 982, 984-85 (Fed. Cir. 1984). See also *Atari, Inc. v. JS & A Group, Inc.*, 747 F.2d 1422, 223 U.S.P.Q. (BNA) 1074 (Fed. Cir. 1984) (in banc).

n15 See *supra* note 3.

n16 28 U.S.C. § 1338(a) (1982) states:

"Patents, plant variety protection, copyrights, trademarks, and unfair competition

"(a) The district courts shall have original jurisdiction of any civil action arising under any Act of Congress relating to patents, plant variety protection, copyrights and trademarks. Such jurisdiction shall be exclusive of the courts of the states in patent, plant variety protection and copyright cases."

[**41]

n17 28 U.S.C. § 1295(a)(1) (1982) states:

"Jurisdiction of the United States Court of Appeals for the Federal Circuit

"(a) The United States Court of Appeals for the Federal Circuit shall have exclusive jurisdiction --

"(1) of an appeal from a final decision of a district court of the United States, the United States

District Court of the District of the Canal Zone, the District Court of Guam, the District Court of the Virgin Islands, or the District Court for the Northern Mariana Islands, if the jurisdiction of that court was based, in whole or in part, on section 1338 of this title, except that a case involving a claim arising under any Act of Congress relating to copyrights or trademarks and no other claims under section 1338(a) shall be governed by sections 1291, 1292, and 1294 of this title[.]”

Nevertheless, in deciding these nonpatent matters we do so “in the light of the problems faced by the district court from which each count originated, including [*42] the law there applicable,” *Bandag*, 750 F.2d at 909, 223 U.S.P.Q. at 986, and in the remaining portions of this opinion we will be guided by the relevant law in the Ninth Circuit, to the extent it can be discerned. n18

n18 It has been clearly stated that in appeals to this court under 28 U.S.C. § 1295(a) of cases involving patent and certain nonpatent counts, “it will be the role and duty of the advocates to brief and argue [the nonpatent counts] in the appeal . . . just as if they were appearing . . . before that circuit [from which the case originated].” *Atari*, 747 F.2d at 1440, 223 U.S.P.Q. at 1087. Such a rule could not in all fairness be applied in this case, as both of the appealed summary judgment decisions were argued and decided and all of the appeal briefs to this court were prepared and filed prior to the statement of the rule. Nevertheless, future litigants will be expected to frame their discussion of appealed nonpatent counts appropriately.

[**43]

A. *Lanham Act Cause of Action*

Cable’s federal nonpatent count is an action brought under the Lanham Act § 43(a), 15 U.S.C. § 1125(a)

(1982). In essence, it is charged that the commercial configuration of the Cable night light has [*1030] come to designate origin, and thus that Genmark’s use of an allegedly similar configuration in its own commercial product constitutes a prohibited false designation of origin.

Apart from what must be shown regarding an alleged copy in order to impose liability for copying, protection under the Lanham Act of the physical details and design of a product may be available if such features both (1) have acquired secondary meaning and (2) are nonfunctional. *Vuitton Et Fils S.A. v. J. Young Enterprises, Inc.*, 644 F.2d 769, 772, 210 U.S.P.Q. (BNA) 351, 353-54 (9th Cir. 1981).

The district court concluded that Cable was not entitled to protection as a matter of law, based on the second requirement, by concluding that the functionality of the Cable night light design was beyond dispute. To so conclude, [*44] it focused on the positions of Cable before the United States Patent and Trademark Office in obtaining allowance of the Schwartz utility patent and before the district court in opposing Genmark’s motion for summary judgment on the patent count of this case. The argument Cable made was described as to the effect that the “night light’s configuration was utilitarian -- indeed, patentably so, providing special advantages in compactness, efficient bulb change, and light diffusion.” 586 F. Supp. at 1508, 223 U.S.P.Q. at 293. The district court thus held that Cable was bound by the argument it made on behalf of the nonobviousness of claims in a patent, n19 when the issue under consideration was the functionality of the actual design of a commercial device. In view of the considerations discussed below, the two can hardly be presumed to be even similar questions.

n19 An examination of the specification and prosecution history pertinent to the Schwartz patent, which are before us in the record, reveals no such argument made as to the utilitarian advantages mentioned by the district court. According to the customary practice, the argument of the parties below has not been included among the documents presented for our review. Thus, we are not in a position to verify or deny the correctness of the characterization of the district court, but do, out of deference to its proximity to the participants in argument below and because the matter has not been disputed by

770 F.2d 1015, *1030; 1985 U.S. App. LEXIS 15064, **44;
226 U.S.P.Q. (BNA) 881

Cable, defer to its description of those arguments and presume the accuracy thereof for purposes of reaching our decision.

[**45]

Nonobviousness is a question of law fully reviewable on appeal. *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 1344, 220 U.S.P.Q. (BNA) 777, 782 (Fed. Cir.), cert. denied, 469 U.S. 830, 105 S. Ct. 116, 83 L. Ed. 2d 60, 225 U.S.P.Q. (BNA) 232 (1984). On the other hand, functionality in the context of this case is a question of a highly factual nature. See *Vuitton*, 644 F.2d at 775, 210 U.S.P.Q. at 356. When the district court ruled on the issue of functionality, it improperly deprived Cable of the right to have a fact-finding tribunal examine the actual evidence which has bearing on the functionality question.

Below it was not a matter of examining the evidence proffered and concluding that there existed "no genuine issue as to any material fact," as required for a grant of summary judgment. *Fed. R. Civ. P.* 56(c). That point in analysis was never reached, because rather than looking to the actual evidence on nonfunctionality, the district court chose to utilize arguments made in relation to the meaning of invalid patent claims as admissions against interest about the factual nature of a product design. It did this, as far as [**46] we can determine, without analytically verifying the soundness for doing so. The court appears not to have considered whether the meaning of those claims was so unavoidably identical to the details of the product design ultimately marketed as to warrant the desirability or suitability of the use of statements about the former as reliable or legally binding admissions about the latter.

In evaluating arguments made on behalf of the right to obtain or retain a patent, the proper object of scrutiny is the meaning of patent claims when compared to the teachings of the prior art. On the other hand, in assessing the right to protection from unfair product copying, the proper object of attention is the actual marketplace design of and marketing practices for an allegedly copied product when compared [**1031] to those of the alleged copy. The aim of the patent system is to enhance the incentive for useful innovation; the aim of the Lanham Act, section 43(a), even in the context of product simulation, is to protect a trader's established identity. See *International Order of Job's Daughters v. Lindeburg & Co.*, 633 F.2d 912, 918-19, 208 U.S.P.Q. (BNA) 718,

724-25 (9th Cir. 1980), [**47] cert. denied, 452 U.S. 941, 101 S. Ct. 3086, 69 L. Ed. 2d 956, 213 U.S.P.Q. (BNA) 1056 (1981) ("to protect consumers against deceptive designations of the origin of goods and, conversely, to enable producers to differentiate their products from those of others").

In resolving the question of product design functionality for purposes of the Lanham Act, section 43(a), the fact finder is to consider the appearance of the products in issue. Reference to utility patent claims that are, or have been, asserted to read on either product, or to the appearance of the device depicted in figures included in the patent specification supporting such claims, must be done with caution. Cf. *Best Lock Corp. v. Schlage Lock Co.*, 56 C.C.P.A. 1472, 413 F.2d 1195, 1199, 162 U.S.P.Q. (BNA) 552, 556 (1969) (cautioning that "a utility patent is only 'some evidence' as to functionality" in its explanation of statements in *In re Shenango Ceramics, Inc.*, 53 C.C.P.A. 1268, 362 F.2d 287, 292, 150 U.S.P.Q. (BNA) 115, 120 (1966)). See also, *In re Hollaender Manufacturing Co.*, 511 F.2d 1186, 1188, 185 U.S.P.Q. (BNA) 101, 102 (CCPA 1975); [**48] *In re Honeywell, Inc.*, 497 F.2d 1344, 1348, 181 U.S.P.Q. (BNA) 821, 824 (CCPA 1974). Claims may be capable of reading on many devices of strikingly different configuration. Thus, even the fact that the claims read on two commercial devices in the marketplace is not support in itself for a finding that one is a copy of the other or confusingly similar thereto for section 43(a) purposes. A manufacturer may choose in its commercial embodiment of a patented device to less than faithfully replicate the exemplary depiction of a claimed embodiment shown in the figures of the patent. Hence, for purposes of evaluating the existence or impact of product copying, the relevance of patent figures depends on the extent to which their appearance is replicated in the actual marketplace product of the patentee. We have been shown no Ninth Circuit precedent to the contrary.

Concluding that the grant of summary judgment as to Cable's Lanham Act count was improper, we vacate that portion of the case and remand it for further proceedings consistent with the above discussions. To guide [**49] its analysis regarding functionality, the district court is to utilize the ample case law available from the Ninth Circuit.

B. State Causes of Action

The two California State causes of action contained

in Cable's amended complaint will be treated together below. In one, a count for unfair competition, it is charged that Genmark, desiring not to create its own original night light design, but rather to trade upon the good will reposed by the purchasing public in the configuration and packaging of Cable's night light, deliberately copied both. In the other state count, the use of the configuration chosen by Genmark for its night light is alleged to contribute to the dilution and to constitute infringement of Cable's rights in California State trademark registration number 70905, which is apparently substantially identical in appearance to that of Cable's night light.

The district court granted summary judgment as to both state causes, dismissing them for essentially the same reasons. 586 F. Supp. at 1508, 223 U.S.P.Q. at 293. The state counts were said to present a "paradigm case" in which to apply the "established principles of federal preemption" of state-law [*50] intellectual property protection found in *Sears, Roebuck & Co. v. Stiffel Co.*, 376 U.S. 225, 11 L. Ed. 2d 661, 84 S. Ct. 784, 140 U.S.P.Q. (BNA) 524, *reh'g denied*, 376 U.S. 973, 84 S. Ct. 1131, 12 L. Ed. 2d 87 (1964), and *Compco Corp. v. Day-Brite Lighting, Inc.*, 376 U.S. 234, 140 U.S.P.Q. (BNA) 528, 11 L. Ed. 2d 669, 84 S. Ct. 779, *reh'g denied*, 377 U.S. 913, 84 S. Ct. 1162, 12 L. Ed. 2d 183 (1964). As an "alternative ground" for its decision, the district court relied on its conclusion mentioned above that the functionality of [*1032] Cable's product configuration was beyond dispute. That configuration was thus held not to be susceptible to protection under California law, either in the form of a registered state trademark, or as a product capable of being unfairly copied by competitors. *Id.* The error in the conclusion of the district court on functionality has already been addressed in relation to the Lanham Act count. Those same remarks are equally applicable to the dismissal of state causes of action. The discussion which follows will accordingly treat solely the issue of federal-state preemption. [*51]

1. Choice of Law

The Federal Circuit is vested with exclusive jurisdiction over the appeals of final decisions in cases before federal district courts only where the jurisdiction of those courts was based in whole or in part on the patent provisions of 28 U.S.C. § 1338. *See* 28 U.S.C. § 1295(a)(1). n20 In creating this nationwide subject matter jurisdiction in the area of patent appeals, it was the

intention of Congress to provide a forum that would increase doctrinal stability in the area of patent law and reduce forum shopping, which was considered to be common in patent litigation. n21 Nevertheless, section 1295(a)(1) does not limit the jurisdiction of the Federal Circuit over appeals from the district courts exclusively to the review of claims based on the patent laws. When patent claims are joined in the same case with other counts, the appeal of nonpatent counts accompanies the appeal of the patent count to this court. In such "mixed cases" this avoids the bifurcation of appeals between the Federal Circuit and the [*52] regional circuit to which appeals from the district court of nonpatent counts would otherwise be directed. *See* H.R. Rep. No. 312, 97th Cong., 1st Sess. 41 (1981), quoted and discussed in *Atari, Inc. v. JS & A Group, Inc.*, 747 F.2d 1422, 1435, 223 U.S.P.Q. (BNA) 1074, 1083-84 (*Fed. Cir.* 1984) (in banc).

n20 *See supra* note 17.

n21 For the legislative history of the statute creating the United States Court of Appeals for the Federal Circuit, the Federal Courts Improvement Act of 1982, Pub. L. No. 97-164, 96 Stat. 25, and the intention of Congress thereby to achieve this uniformity, see S. Rep. No. 97-275, 97th Cong., 2d Sess. 3-6, *reprinted* in 1982 U.S. Code Cong. & Ad. News 11, 13-16. Uniformity was also sought in federal personnel, government contract, and Little Tucker Act cases. 28 U.S.C. § 1295 (1982).

Congress recognized that this solution for reducing forum shopping in patent litigation and for avoiding bifurcated appeals, could through the [*53] joinder of frivolous patent causes of action, for example, "create forum shopping opportunities between the Federal Circuit and the regional courts of appeals on other [nonpatent] claims." S. Rep. No. 97-275, 97th Cong., 2d Sess. 19-20, *reprinted* in 1982 U.S. Code Cong. & Ad. News 11, 30. Several appropriate responses by the circuit courts were recommended. *Id.*

In due course it became apparent that even the joinder of nonfrivolous patent counts with other nonpatent causes of action creates a potential for forum shopping in the appeal of the nonpatent causes.

Recognizing that the motivation for such appeal forum shopping resides in the perceived opportunity to secure on appeal the application in the nonpatent counts of law differing from that which would otherwise be used in the regional circuit, this court sitting in banc at its own initiative declared in *Atari*, 747 F.2d at 1440, 223 U.S.P.Q. at 1087, its intention in the review of certain nonpatent matters to apply the "discernible law of the involved circuit" from which the appeal originated. n22

n22 This general principle had already been specifically effected by various three-judge panels of this court in reviewing specific procedural matters. In *re Medical Prosthetics Research Associates, Inc.*, 739 F.2d 618, 620 (Fed. Cir. 1984); *W.L. Gore & Associates, Inc. v. International Medical Prosthetics Research Associates, Inc.*, 745 F.2d 1463, 223 U.S.P.Q. (BNA) 884 (Fed. Cir. 1984); *Panduit Corp. v. All States Plastic Manufacturing Co.*, 744 F.2d 1564, 223 U.S.P.Q. (BNA) 465 (Fed. Cir. 1984) (all concerning attorney disqualification), and specific substantive matters. See *American Hoist & Derrick Co. v. Sowa & Sons*, 725 F.2d 1350, 1366-67, 220 U.S.P.Q. (BNA) 763, 775-76 (Fed. Cir.), cert. denied, 469 U.S. 821, 105 S. Ct. 95, 83 L. Ed. 2d 41 (1984) (the necessity of showing relevant market to establish a section 2 Sherman Act violation); *Bandag, Inc. v. Al Bolser's Tire Stores, Inc.*, 750 F.2d 903, 909, 223 U.S.P.Q. (BNA) 982, 986 (Fed. Cir. 1984) (infringement of federally registered trademarks). All were cited in *Atari*, 747 F.2d at 1438-40, 223 U.S.P.Q. at 1086-87, as having recognized the "freedom of the district courts to follow the guidance of their particular circuits in all but the substantive law fields assigned exclusively to this court."

[**54]

[*1033] 2. Preemption

Notwithstanding the fact that the Supreme Court has made several pronouncements on the interrelationship of the federal patent laws to state protection of intellectual property, n23 we conclude that the proper reach of the preemptive effect of the federal patent laws in relation to the diverse assortment of trade regulation laws existing in the fifty states is not a matter over which this court has a

mandate to unify the law evolved in the regional circuits.

n23 In addition to the *Sears and Compco* cases already cited, see, e.g., *Kewanee Oil Co. v. Bicron Corp.*, 416 U.S. 470, 181 U.S.P.Q. (BNA) 673, 40 L. Ed. 2d 315, 94 S. Ct. 1879 (1974); *Goldstein v. California*, 412 U.S. 546, 178 U.S.P.Q. (BNA) 129, 37 L. Ed. 2d 163, 93 S. Ct. 2303, reh'g denied, 414 U.S. 883, 38 L. Ed. 2d 131, 94 S. Ct. 27 (1973).

This issue [**55] is not one that can come before this court in the appeal of a case that was based at the district court level solely on the patent provisions of 28 U.S.C. § 1338(a). The federal-state preemption question is presented exclusively in state intellectual property causes of action. When a patent cause is joined with a state intellectual property cause of action in a single "mixed" case, and both causes are appealed, the issue of federal-state preemption can reach this court for review. In the absence of a patent count below, the appeal of the state action and the associated preemption issue will be resolved in the regional circuit. Thus, the correct application of the preemption principles voiced in *Sears and Compco* is a responsibility which is shared between this court and the regional circuits.

Consequently, under the guidance of *Atari*, when the preemption issue is reviewed in this circuit we will apply the law that has evolved in the regional circuit in [**56] which the case containing the issue was originally tried. Adopting this course will then assure that preemption is applied uniformly in the cases of a given regional circuit, whether they are appealed there or, by including a nonfrivolous patent cause of action, reviewed here. Such a rule will reduce the incentive for forum shopping with respect to a significant threshold issue in state causes of action.

3. Disposition

Unfortunately, when it decided whether the state counts pled by Cable in this case were preempted by *Sears and Compco*, the district court did not look to the law of the Ninth Circuit for standards or methodology. This was understandable because at that time the gathering consensus of this court regarding the correct body of law under which to review certain nonpatent matters had yet to be announced in our decision in *Atari*.

770 F.2d 1015, *1033; 1985 U.S. App. LEXIS 15064, **56;
226 U.S.P.Q. (BNA) 881

n24 Accordingly, neither the district court nor this one has had the benefit of any presentation by the parties on the issue of federal-state preemption in terms of the Ninth Circuit law which is proper to consult in this instance.
n25

n24 The district court supported its decision that preemption applies in this case exclusively with the authority of *Litton Systems, Inc. v. Whirlpool Corp.*, 728 F.2d 1423, 1448-49, 221 U.S.P.Q. (BNA) 97, 113 (Fed. Cir. 1984). *Litton* not only preceded the in banc pronouncements on choice of law in *Atari*, but it held that preemption applied to a pair of Minnesota State causes of action without finding it necessary to address the choice of law issue. *Litton* did acknowledge the potential for a choice of law issue as to another nonpatent count there on appeal, a cause of action under section 43(a) of the Lanham Act, but explicitly refrained from resolving that choice in deciding the appeal. The correct body of law to apply in section 43(a) matters was determined subsequently in *Bandag, Inc. v. Al Bolser's Tire Stores, Inc.*, 750 F.2d 903, 909, 223 U.S.P.Q. (BNA) 982, 986 (Fed. Cir. 1984), which was issued on the same day as *Atari*.

[**57]

n25 See *supra* note 18.

Accordingly, the grant of summary judgment as to both state actions is vacated, and these counts are remanded for reconsideration [*1034] by the district court in light of the *Atari* mandate to use local circuit law in doing so. This is done out of fairness to the litigants who should be able in our view to address the state causes in such terms before a decision is rendered. Nevertheless, we do so without making any suggestions as to what would be a correct resolution of the federal-state preemption issue when considered under the law of the Ninth Circuit. n26

n26 But cf. *Petersen Manufacturing Co. v. Central Purchasing, Inc.*, 740 F.2d 1541, 1550 n.10, 222 U.S.P.Q. (BNA) 562, 569 n.10 (Fed. Cir. 1984), where a panel of this court stated in

dicta that the Ninth Circuit precedent, *Tveter v. AB Turn-O-Matic*, 633 F.2d 831, 209 U.S.P.Q. (BNA) 22 (9th Cir. 1980), held in effect that the state law trademark claim in *Petersen* was properly dismissed under *Sears and Compco*.

[**58]

IV. CONCLUSION

The grant of summary judgment based on the invalidity of the Schwartz patent is affirmed. The grant of summary judgment as to the Lanham Act and the two California State causes of action is vacated. Those causes are remanded for such further proceedings as are rendered appropriate by this opinion.

The conduct of discovery in this case is returned to the sound discretion of the district court. It is free at the request of either party to reconsider or affirm any of its earlier discovery rulings based on the legal issues and factual areas of inquiry that it deems have relevance to this case in view of the above discussions.

AFFIRMED-IN-PART, VACATED-IN-PART,
AND REMANDED.

APPENDIX

In Claim 1 of the Schwartz patent bracketed material and paragraphing have been added below:

1. A portable light-sensitive electrical device capable of being used with and movable between one or more of a number of spaced existing conventional electrical receptacles of the type normally found mounted in walls, or the like, comprising in combination:

[a.] a housing having front, rear, side, top and bottom wall portions,

[b.] an electrical circuit carried within
[**59] said housing,

[c.] blade means electrically connected to said circuit with portions thereof extending from said housing for removably matingly engaging and being physically mounted to contacts of an electrical receptacle,

[d.] lamp-receiving socket means electrically cooperative with said circuit and whose substantially sole source of current is from said receptacle,

[e.] and light-sensitive means carried by said housing and disposed so as to be able to receive ambient light for controlling current flow from one of said receptacle contacts to said socket means, allowing more current flow to said socket means as ambient light received by said light-sensitive means decreases and lesser current flow to said socket means as said received light increases,

said device being characterized by the absence of need for a power source other than that to which it is connected and

wherein said housing does not cover the receptacle openings and surrounding receptacle portions of the unused receptacle of a duplex receptacle to which the device is connected,

said light sensitive means including a photo conductive cell,

said device [further] including

[i.] an electric light
[**60] bulb with portions thereof mounted in said socket and

[ii.] a shade of predetermined shape and appearance,

said shade comprising front and side wall portions, said front wall portion having a generally planar surface extending between generally rectangular edges including longer vertically extending edges and relatively shorter horizontally extending edges, said side wall portions extending in a diverging manner generally [*1035] symmetrically at a predetermined angle greater than 90 degrees away from said front wall portion toward a rearward plane of said housing,

said shade being formed . . . at said front wall portion with a generally polygonal-shaped pattern extending over substantially the entire front wall portion,

said shade further comprising bottom means capable of being swung inwardly to frictionally engage and disengage in a snap-on manner and be mounted to said housing in a position with respect to said housing illustrated in FIG. 1 of the drawing, said shade engagement and disengagement with said housing facilitating repeated replacement of said bulb.

LEXSEE 424 F.3D 1293

**CROSS MEDICAL PRODUCTS, INC., Plaintiff-Appellee, v. MEDTRONIC
SOFAMOR DANEK, INC. and MEDTRONIC SOFAMOR DANEK USA, INC.,
Defendants-Appellants.**

05-1043

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

424 F.3d 1293; 2005 U.S. App. LEXIS 21200

September 30, 2005, Decided

SUBSEQUENT HISTORY: Rehearing denied by, Rehearing, en banc, denied by *Cross Med. Prods. v. Medtronic Sofamor Danek, Inc.*, 2005 U.S. App. LEXIS 25585 (*Fed. Cir.*, Nov. 8, 2005)

PRIOR HISTORY: [*1] Appealed from: United States District Court for the Central District of California Senior Judge Gary L. Taylor. *Cross Med. Prods. v. Medtronic Sofamor Danek, Inc.*, 2005 U.S. Dist. LEXIS 6545 (*C.D. Cal.*, Apr. 8, 2005)

DISPOSITION: AFFIRMED-IN-PART, REVERSED-IN-PART, VACATED-IN-PART, AND REMANDED.

COUNSEL: Bruce D. Kuyper, Latham & Watkins, LLP, of Los Angeles, California, argued for plaintiff-appellee. With him on the brief were Brian F. McMahon; Mark A. Finkelstein, Allan Z. Litovsky, and Jordan B. Kushner of Costa Mesa, California.

Dirk D. Thomas, Robins, Kaplan, Miller & Ciresi L.L.P., of Washington, DC, argued for defendants-appellants. With him on the brief were Robert A. Auchter; Jan M. Conlin and Munir R. Meghjee, of Minneapolis, Minnesota.

JUDGES: Before SCHALL, GAJARSA, and LINN, Circuit Judges.

OPINION BY: LINN

OPINION

[*1296] LINN, *Circuit Judge*.

Medtronic Sofamor Danek, Inc. et al. ("Medtronic") appeals from an order of the United States District Court for the Central District of California ("district court") permanently enjoining Medtronic from infringing claim 5 of U.S. Patent No. 5,474,555 ("the '555 patent'") owned by Cross Medical Products, Inc. ("Cross Medical"). See *Cross Med. Prods., Inc. v. Medtronic Sofamor Danek, Inc.*, 2004 U.S. Dist. LEXIS 27643, No. SA CV 03-110-GLT(ANx) (*C.D. Cal. Sept. 28, 2004*). The [*1297] permanent [*2] injunction was issued following the grant of Cross Medical's motions for partial summary judgment of validity and infringement. See *Cross Med. Prods., Inc. v. Medtronic Sofamor Danek, Inc.*, 2004 U.S. Dist. LEXIS 27644, No. SA CV 03-110-GLT(ANx) (*C.D. Cal. Aug. 19, 2004*) ("Invalidity Opinion"); *Cross Med. Prods., Inc. v. Medtronic Sofamor Danek, Inc.*, 2004 U.S. Dist. LEXIS 14183, No. SA CV 03-110-GLT(ANx) (*C.D. Cal. May 20, 2004*) ("Infringement Opinion"). As a threshold matter, we conclude, over Cross Medical's objection, that we have jurisdiction over this appeal. On Medtronic's challenge to the district court's claim construction rulings, we affirm the district court's construction of the "anchoring means," "securing means," and "bear against said channel" limitations, but modify the district court's construction of the "anchor seat means" and "operatively joined" limitations. Because we find genuine issues of material fact regarding infringement, we reverse the grant of Cross Medical's motion for partial summary judgment of infringement and find no abuse of discretion in the denial of Medtronic's cross-motion for partial summary judgment of non-infringement. We also reverse the grant

of Cross Medical's motion for partial [*3] summary judgment that claim 5 is not obvious but affirm the grant of that motion as to indefiniteness and anticipation. We further conclude that the district court did not abuse its discretion in denying Medtronic's cross-motion for summary judgment as to these invalidity issues. Consequently, we vacate the permanent injunction. Thus, we affirm-in-part, reverse-in-part, vacate-in-part, and remand.

I. BACKGROUND

This appeal involves orthopedic surgical implants used to stabilize and align the bones of a patient's spine. A common problem with spinal fixation is determining how to secure the fixation device to the spine without damaging the spinal cord. Methods of fixation have developed which utilize wires that extend through the spinal canal and hold a rod against the lamina, ¹ or that utilize pedicular screws which extend into the pedicle ² and secure a plate which extends across vertebral segments. The system taught in *U.S. Patent No. 4,805,602* ("the '602 patent'"), which is also assigned to Cross Medical and is part of the case against Medtronic but not involved in this appeal, exemplifies the advantages of both methods. The screw and rod system of the '602 patent provides a rigidity [*4] which is intermediate between wired implant and plate systems. Several screw and rod systems are known in the art. Those which feature an anchor secured to the bone by a separate screw are termed "polyaxial." Polyaxial screws have a capability of pivoting in the anchor. Devices in which the anchor and the bone screw form a unitary body are deemed "monoaxial." Monoaxial screws have no ability to pivot relative to the anchor.

1 The "lamina" is part of the neural arch of a vertebra extending from the pedicle to the median line.

2 The "pedicle" is the basal part of each side of the neural arch of a vertebra connecting the laminae with the centrum.

Cross Medical's '555 patent discloses a device, an embodiment of which is illustrated in Figures 1, 2, and 3 below:

[*1298] GET DRAWING SHEET 1 OF 7

GET DRAWING SHEET 1 OF 7

GET DRAWING SHEET 1 OF 7

The '555 device allows a surgeon to place a series of bone screws 21, each carrying an anchor seat 23, into the bones of a patient. A stabilization rod 18 thereafter may be positioned in the channels 51, 52 of the anchor seats. The '555 device allows surgeons to secure the rod to the anchor seats with top-tightening [*5] nuts 27. By connecting the rod in this fashion to the anchors on adjacent spinal bones, the position of the patient's spine may be fixed as desired by the surgeon.

On February 4, 2003, Cross Medical filed suit alleging that certain of Medtronic's polyaxial screws--MAS, Vertex, M8, Sextant, M10, Legacy 4.5, and Legacy 5.5--infringe the '555 patent and *U.S. Patent No. 5,466,237* ("the '237 patent'"). The accused devices employ a "set screw," which features external threads to mate with the receiver member's internal threads, to hold the rod in the receiver member. The accused devices also include a "crown member" that lies between the rod and the bone screw. An illustration of the accused device follows, with explanatory text added.

[SEE ILLUSTRATION IN ORIGINAL]

Medtronic denied infringement and counterclaimed seeking a declaratory judgment of non-infringement and invalidity. Subsequent to the initial pleading, responses and amended pleadings added claims and counterclaims relating to several additional patents, including the '602 patent. The district court resolved several issues through summary adjudication. Of importance to this appeal, the district [*1299] court separately entertained [*6] motions for partial summary judgment of infringement and validity of claim 5 of the '555 patent.

Claim 5 recites:

A fixation device for the posterior stabilization of one or more bone segments of the spine, comprising:

at least two anchors and an elongated stabilizer comprising a rod having a diameter and a longitudinal axis, said anchors each comprising *anchoring means* which secure said anchors to said bone segment and an *anchor seat means* which has a lower bone interface *operatively joined* to said bone segment and an anchor

seat portion spaced apart from said bone interface including a channel to receive said rod; and

securing means which cooperate with each of said anchor seat portions spaced apart from said bone interface and exterior to the bone relative to said elongated rod, said seat means including a vertical axis and first threads which extend in the direction of said vertical axis toward said lower bone interface to a depth below the diameter of the rod when it is in the rod receiving channel, and said securing means including second threads which cooperate with the first threads of the seat means to cause said rod to *bear against said* [*7] *channel* through the application of substantially equal compressive forces by said securing means in the direction of the vertical axis and applied on either side along said longitudinal axis of said channel.

'555 patent, col. 8, ll. 33-57 (emphases added).

On May 29, 2004, the district court construed the "operatively joined," "securing means," and "bear against said channel" limitations of claim 5 of the '555 patent. Based on these constructions, the court granted Cross Medical's motion for partial summary judgment of infringement, and denied Medtronic's cross-motion for partial summary judgment of non-infringement. On August 19, 2004, the district court additionally construed the "anchor seat means" and "anchoring means" limitations of claim 5 of the '555 patent. The court then denied Medtronic's motion for partial summary judgment that claim 5 was anticipated, obvious, and indefinite, and granted Cross Medical's cross-motion for partial summary judgment that claim 5 was neither anticipated, obvious, nor indefinite.

On September 28, 2004, with proceedings still on-going with respect to the '555 patent and other patents-in-suit, the district court granted Cross Medical's [*8] motion for a permanent injunction to preclude Medtronic's infringement of claim 5 of the '555 patent. The district court presumed irreparable harm because Cross Medical had prevailed on the merits at the summary judgment stage. Medtronic argued that there

could be no harm because it withdrew all of the asserted infringing devices from the market; however, the district court found that some of the infringing products remained available and that Medtronic had the capacity to bring infringing product back to market. On October 4, 2004, the district court stayed the injunction for 90 days to allow Medtronic time to appeal.

On October 13, 2004, Medtronic appealed from the order granting the injunction, asserting jurisdiction under 28 U.S.C. § 1292(a)(1), (c)(1). Medtronic asks this court to review the district court's claim construction rulings, reverse or vacate the district court's partial summary judgment orders on infringement, indefiniteness, anticipation, and obviousness with respect to claim 5 of the '555 patent, and vacate the permanent injunction. On November 19, 2004, Cross Medical filed a motion to dismiss this appeal for lack of jurisdiction.

[*1300] II. DISCUSSION

[**9] A. Jurisdiction

"Whether this court has jurisdiction over an appeal taken from a district court judgment is a question of law which we address in the first instance." *Pause Tech. LLC v. TiVo Inc.*, 401 F.3d 1290, 1292 (Fed. Cir. 2005). Section 1292(a)(1) provides that the court of appeals has jurisdiction over appeals from interlocutory orders "granting, continuing, modifying, refusing or dissolving injunctions, or refusing to dissolve or modify injunctions." 28 U.S.C. § 1292(a)(1) (2000). Section 1292(c)(1) provides this court exclusive jurisdiction over an appeal of an interlocutory order granting an injunction if we would otherwise have jurisdiction under § 1295. *Id.* § 1292(c)(1). Medtronic appeals from an order permanently enjoining Medtronic from infringing the '555 patent. On its face, the order falls within the scope of § 1292(a)(1), (c)(1).

Cross Medical argues that under *Woodard v. Sage Products, Inc.*, 818 F.2d 841 (Fed. Cir. 1987) (en banc), this court does not possess jurisdiction because the injunction is one in form but not substance. Cross Medical asserts that the injunction is not coercive because it [*10] enjoins Medtronic from engaging in activities it had abandoned before the injunction issued. Cross Medical asserts that Medtronic simply should have sought a stay of the injunction pending appeal under *Federal Rule of Appellate Procedure 8(a)*. Alternatively, Cross Medical argues that even if the court has

jurisdiction to review the order, it has no jurisdiction to reverse or vacate the partial summary judgment rulings because no final judgment on the '555 patent has been entered, and the orders were not certified for appeal.

Medtronic counters that the order falls under § 1292(a)(1), (c)(1). Medtronic asserts that *Sage Products* is inapposite and that no case has denied jurisdiction in an appeal from the grant of an injunction. Medtronic states that Cross Medical argued below that the injunction was necessary to prevent irreparable harm, that Medtronic pulled products from the market to avoid a willfulness finding, that the district court entered the injunction with full knowledge of Medtronic's actions, and that it would be unfair to deny Medtronic its statutory right of appeal.

Cross Medical's reliance on *Sage Products* is misplaced. [*11] In *Sage Products*, plaintiff's amended complaint included a prayer for injunctive relief, and the issue was whether plaintiff could lodge an appeal under § 1292(a)(1) from an order granting defendant's motion for summary judgment of non-infringement. 818 F.2d at 843-44. There was no order specifically denying injunctive relief. *Id.* Instead, plaintiff argued that the adverse summary judgment ruling had the effect of denying injunctive relief. *Id.* at 844. This court sitting en banc considered the impact of the Supreme Court's then recent decision in *Carson v. American Brands, Inc.*, 450 U.S. 79, 67 L. Ed. 2d 59, 101 S. Ct. 993 (1981). We explained that *Carson* "instructed that an interlocutory appeal under section 1292(a)(1) requires (a) that the order be injunctive in nature, (b) that it cause a serious, if not irreparable, consequence, and (c) that the order can be effectively challenged only by immediate appeal." *Sage Products*, 818 F.2d at 849. We held that Woodard failed to establish that the order met the *Carson* requirements. *Id.* at 855.

However, in reporting on how other courts interpreted *Carson* [*12] , we criticized the Seventh Circuit for applying "the *Carson* requirements to an order explicitly granting an injunction," observing that "the Supreme Court in *Carson* expressly limited its holding to orders that have 'the practical effect of refusing an "' injunction. [*1301] *Id.* at 850 n.6 (quoting *Carson*, 450 U.S. at 84). We explained that "as a rule of general applicability to orders deemed to deny injunctions, the *Carson* rule is workable and sensibly balances the statutory provisions of sections 1291 and 1292(a)(1) in light of their respective purposes." *Id.* at 853. The

Supreme Court subsequently confirmed our reading of *Carson* as applying only to orders that have "the practical effect of granting or denying injunctions." *Gulfstream Aerospace Corp. v. Mayacamas Corp.*, 485 U.S. 271, 287-88, 99 L. Ed. 2d 296, 108 S. Ct. 1133 (1988) ("Section 1292(a)(1) will, of course, continue to provide appellate jurisdiction over orders that grant or deny injunctions and orders that have the practical effect of granting or denying injunctions and have "serious, perhaps irreparable, " consequence." (quoting *Carson*, 450 U.S. at 84 [*13] (quoting *Baltimore Contractors, Inc. v. Bodinger*, 348 U.S. 176, 181, 99 L. Ed. 233, 75 S. Ct. 249 (1955))))); see also 19 James Wm. Moore et al., *Moore's Federal Practice* P203.10[2][a], at 12 (3d ed. 2005) ("*Moore's*") ("While the statute clearly applies to orders that formally grant injunctive relief, it also authorizes interlocutory appeals from orders that have the practical effect of granting an injunction."). Therefore, "if the district court's order expressly grants an injunction, the order is appealable under § 1292(a)(1), without regard to whether the appellant is able to demonstrate serious or irreparable consequences." *Moore's* P203.10[2][a], at 14.

In this case, the district court entered an order expressly enjoining Medtronic from infringing claim 5 of the '555 patent. Thus, *Carson* is inapplicable. See *PIN/NIP, Inc. v. Platte Chem. Co.*, 304 F.3d 1235, 1242 (Fed. Cir. 2002) (finding jurisdiction without referring to the *Carson* test because "the district court's grant of a permanent injunction ...[brought the] appeal squarely within the confines of § 1292(a)(1)"). On appeal from the district court's grant of the injunction, [*14] we have jurisdiction under 28 U.S.C. § 1292(a)(1).

Moreover, we may review the underlying partial summary judgment orders because they are inseparably connected to the merits of the permanent injunction. See *id.* at 1242-48 (reviewing a summary judgment ruling that a claim was not anticipated by the prior art where jurisdiction was based on § 1292(a)(1), (c)(1)); *Katz v. Lear Siegler, Inc.*, 909 F.2d 1459, 1461 (Fed. Cir. 1990) (reviewing propriety of joinder of counter-defendant on appeal from injunction); *Moore's* P203.10[7][b], at 45-47 ("[An interlocutory appeal under § 1292(a)(1)] enables the circuit court to review other orders that are inseparably or very closely connected with the merits of the injunctive order"). The district court presumed irreparable harm based on Cross Medical's success on the merits, which manifested itself in the summary judgment

orders concerning claim 5. Because Cross Medical's success on the merits turns on the propriety of the summary judgment rulings, our review of the grant of the permanent injunction requires that we rule on the summary judgment orders. See *Mendenhall v. Barber-Greene Co.*, 26 F.3d 1573, 1581 n.12 (Fed. Cir.1994) [*15] (noting "that an interlocutory appeal from a permanent injunction, to the extent that it considers questions of validity and infringement ...is identical in substance to an appeal brought under § 1292(c)(2)"). The cases cited by Cross Medical are not germane.

For these reasons, Cross Medical's motion to dismiss the appeal for lack of jurisdiction is denied.

B. Standard of Review

"We review the grant of a permanent injunction for an abuse of discretion which [*1302] requires plenary review of the correctness of ...rulings on matters of law." *Stratos Mobile Networks USA, LLC v. United States*, 213 F.3d 1375, 1379 (Fed. Cir. 2000) (internal quotations omitted). We review the grant of a motion for summary judgment *de novo*. *Id.* However, we review the denial of a motion for summary judgment for abuse of discretion. *Gart v. Logitech, Inc.*, 254 F.3d 1334, 1338 (Fed. Cir. 2001). Summary judgment should only be granted "if the pleadings, depositions, answers to interrogatories, and admissions on file, together with the affidavits, if any, show that there is no genuine issue as to any material fact and that the moving party is entitled to a judgment as [*16] a matter of law." *Fed. R. Civ. P. 56(c)*. In applying this standard, "the evidence of the non-movant is to be believed, and all justifiable inferences are to be drawn in [the non-movant's] favor." *Anderson v. Liberty Lobby, Inc.*, 477 U.S. 242, 255, 91 L. Ed. 2d 202, 106 S. Ct. 2505 (1986). "The fact that both the parties have moved for summary judgment does not mean that the court must grant summary judgment to one party or the other...Cross-motions are no more than a claim by each party that it alone is entitled to summary judgment, and the court must evaluate each motion on its own merits, taking care in each instance to view the evidence in favor of the nonmoving party." *Bubble Room, Inc. v. United States*, 159 F.3d 553, 561 (Fed. Cir. 1998) (internal citation omitted); accord *Gart*, 254 F.3d at 1338-39.

Claim construction is a question of law reviewed *de novo*. See *Phillips v. AWH Corp.*, 415 F.3d 1303, 1328 (Fed. Cir. 2005) (en banc). Determination of

infringement is a *factual question*. *Bai v. L & L Wings, Inc.*, 160 F.3d 1350, 1353 (Fed. Cir. 1998). "Indefiniteness, [*17] ...like claim construction, is a question of law that we review *de novo*." *Atmel Corp. v. Info. Storage Devices*, 198 F.3d 1374, 1378 (Fed. Cir. 1999). Anticipation is a question of fact. *Advanced Display Sys., Inc. v. Kent State Univ.*, 212 F.3d 1272, 1281 (Fed. Cir. 2000). "Obviousness is a question of law based on underlying facts." *Group One Ltd. v. Hallmark Cards, Inc.*, 407 F.3d 1297, 1303 (Fed. Cir. 2005).

C. Claim Construction

In the course of its rulings on partial summary judgment for both infringement and validity, the district court construed the "anchoring means," "anchor seat means," "operatively joined," "securing means," and "bear against said channel" limitations of claim 5. Medtronic challenges each construction.

1. "anchors each comprising anchoring means ...and anchor seat means"

In the district court, the parties disputed whether either the "anchoring means" limitation or "anchor seat means" limitation imposed a requirement that the bone screws be polyaxial. The district court did not construe each limitation separately. Instead, the district court referred to its prior ruling in [*18] *Cross Med. Prods. v. Depuy Acromed, Inc.*, 2003 U.S. Dist. LEXIS 26720, No. SA CV 00-876-GLT(ANx), (C.D. Cal. Jan. 9, 2003), and explained that both the "anchoring means" and "anchor seat means" limitations were in § 112, P6 form and "must be construed by referring to the specification." *Invalidity Opinion 2004 U.S. Dist. LEXIS 27644*, [WL] at 3-4. The district court held that "although the claim language itself does not indicate whether the screws are polyaxial or monoaxial, the specifications and the drawings establish that the claims are limited to polyaxial screws." 2004 U.S. Dist. LEXIS 27644, [WL] at 3.

Medtronic asserts that although the preferred embodiment describes a polyaxial screw, there is no basis to read this feature into claim 5 because neither "anchoring means" nor "anchor seat means" are [*1303] § 112, P6 limitations. Medtronic argues that even if these are § 112, P6 limitations, a monoaxial screw is an alternative embodiment and, thus, should be considered corresponding structure, citing *Micro Chemical, Inc. v. Great Plains Chemical Co.*, 194 F.3d 1250 (Fed. Cir. 1999). Medtronic also relies on the doctrine of claim

differentiation, arguing that the recitation in claim 1 of a polyaxial screw limitation implies that claim 5 does not possess that [*19] limitation. Finally, Medtronic adds that Cross Medical is estopped from denying that claim 5 covers monoaxial screws because Cross Medical marked its monoaxial screws with the '555 patent number.

Cross Medical counters that both "anchoring means" and "anchor seat means" are § 112, P6 limitations and their corresponding structure is a polyaxial screw. Cross Medical argues that claim differentiation must give way to a proper § 112, P6 analysis and that the court should not consider "marking estoppel" in construing claim 5 because marking is extrinsic evidence. Cross Medical adds that claims should be construed to preserve their validity.

The limitations at issue are contained in the following text of claim 5:

said anchors each comprise *anchoring means* which secure said anchors to said bone segment and an anchor seat means which has a lower bone interface operatively joined to said bone segment and an anchor seat portion spaced apart from said bone interface including a channel to receive said rod....

...said *seat means* including a vertical axis and first threads which extend in the direction of said vertical axis toward said lower bone interface to a depth below [*20] the diameter of the rod when it is in the rod receiving channel

'555 patent, col. 8, ll. 36-43, 46-51 (emphases added).

a. "anchoring means"

The limitation recites the word "means," which gives rise to the presumption that § 112, P6 applies. *See Rodime PLC v. Seagate Tech., Inc.*, 174 F.3d 1294, 1302 (Fed. Cir. 1999). The claimed function of the "anchoring means" is to "secure said anchors to said bone segment." '555 patent, col. 8, ll. 38-39. No structure is recited in the claim to perform this function. *See id.*, ll. 35-56. Thus, § 112, P6 applies and the "claim shall be construed to cover the corresponding structure ..described in the specification and equivalents thereof." 35 U.S.C. § 112, P6 (2000); *Al-Site Corp. v. VSI Int'l, Inc.*, 174 F.3d 1308,

1320 (Fed. Cir. 1999).

The specification discloses only one embodiment. That embodiment contains a screw which carries a separate anchor such that "when the screw 21 engages the anchor seat 23, a limited ball-and-socket joint is formed which permits freedom of movement between the rod support 23 and the screw 21." '555 patent, col. 5, ll. 4-47. The specification [*21] unambiguously states that a feature of the "present invention" is that "each anchor seat is secured by a cancellous screw which cooperates through a sloped bore in the anchor seat so as to provide a limited ball and socket motion." *Id.*, col. 1, l. 65--col. 2, l. 21. It continues:

The present invention utilizes a rod and vertebral anchors which holds [sic] the rod in position. Each anchor is secured to the vertebrae by a transpedicular screw member.

....

...The present design utilizes two implant sets on either side of the spinous processes. Each implant set includes a ...rod Generally, an implant set is used on each side of the spinous processThe rod is held in position by a stainless steel vertebral anchor which captures the rods. The [*1304] anchor has a seat member which is secured to the vertebrae by a stainless steel transpedicular screw. The screw is separate from the anchor seat and thus provides for limited motion between the anchor seat and the vertebrae.

Id., col. 3, ll. 26-67 (emphasis is added). The patent discloses no other structure for securing the anchor to the bone. The patent states that the polyaxial design "acts as a 'shock-absorber' [*22] to prevent direct transfer of load from the rod to the bone-screw interface prior to achieving bony fusion, thereby decreasing the chance of failure." *Id.*, ll. 63-67. Thus, the district court was correct both in linking the recited function to the structure disclosed in the specification and in concluding that the corresponding structure was polyaxial. Medtronic argues that even if the limitation is a means-plus-function limitation linked to the disclosed polyaxial structure, the

claim nonetheless should be construed to include alternative structures like monoaxial screws. However, because there is only one embodiment described in the specification to secure the anchor to the bone—a polyaxial screw and anchor structure—there is no basis on which to extend the limitation to cover alternative, non-disclosed structure not shown to be structurally equivalent. *See* 35 U.S.C. § 112, P6; *Al-Site*, 174 F.3d at 1320.

We reject the parties' remaining arguments. First, although the doctrine of claim differentiation suggests that claim 5 should be broader than claim 1, any presumption that the claims differ with respect to this feature may be overcome [*23] by a contrary construction mandated by the application of § 112, P6. *See Laitram Corp. v. Rexnord, Inc.*, 939 F.2d 1533, 1538 (Fed. Cir. 1991) (holding that the doctrine of claim differentiation yields to an interpretation mandated by § 112, P6). Second, Medtronic's assertion that "marking estoppel" applies is incorrect. Even if Cross Medical marked monoaxial screws with the '555 patent number, such evidence conflicts with the intrinsic record and has no bearing on our construction. *See Phillips*, 415 F.3d at 1318 ("[A] court should discount [extrinsic evidence] that is clearly at odds with the claim construction mandated by the claims themselves, the written description, and the prosecution history, in other words, with the written record of the patent." (internal quotation omitted)); *cf. SmithKline Diagnostics v. Helena Labs. Corp.*, 859 F.2d 878, 890-91 (Fed. Cir. 1988) (holding that an accused infringer's mis-marking of a product could not convert by estoppel an admittedly non-infringing product into an infringing product). Finally, Cross Medical's argument that we should consider the validity of claim 5 in construing [*24] the limitation misses the mark. Because the other claim construction tools unambiguously resolve the claim construction dispute, considering validity would be improper. *Phillips*, 415 F.3d at 1327 ("We have limited the maxim [of construing a claim to preserve its validity] to cases in which 'the court concludes, after applying all the available tools of claim construction, that the claim is still ambiguous.'").

b. "anchor seat means"

While the limitation recites the word "means," thus giving rise to the presumption that § 112, P6 applies, *see Rodime*, 174 F.3d at 1302, the claim language is sufficiently structural as to take the limitation out of the gambit of § 112, P6. Thus, the district court erred in

treating "anchor seat means" as a means-plus-function limitation; however, that error is harmless with respect to the conclusion that the claim covers polyaxial structures, based on the district court's correct construction of the "anchoring means" limitation, discussed *supra*.

[*1305] 2. "operatively joined"

The district court construed "lower bone interface operatively joined to said bone segment" to mean "connected during a surgical procedure." [*25] "*Infringement Opinion* 2004 U.S. Dist. LEXIS 14183, [WL] at 5. The district court interpreted "connect" to mean "in contact." *See id.* & n. 2. The district court reasoned that because the claim involves a surgical procedure, "operatively" means "involving surgical operations." *Id.* The district court explained that construing "operatively" to mean "to produce an appropriate effect" would improperly import a limitation from the specification. 2004 U.S. Dist. LEXIS 14183, [WL] at 4-5.

Medtronic argues that the "bone interface" language surrounding the phrase "operatively joined" requires that there be contact between the bone segment and the anchor seat. Medtronic asserts that "operatively" means to produce an effect and that effect is micro-motion, which Medtronic describes as "limited motion" between the anchor and the bone. Medtronic argues that it would be inconsistent to construe claim 5 to require a polyaxial screw which enables polyaxial movement, but not to require a micro-motion effect. Medtronic adds that the district court's construction renders "operatively" superfluous because the only way to attach the screw to bone is via surgery.

Cross Medical counters that the "bone interface" is the portion of the anchor seat that [*26] comes into contact with the bone when there is contact, but that "bone interface" does not require contact. Cross Medical argues that the district court correctly construed "operatively" to mean "surgically." Cross Medical asserts that even if we construe "operatively" to mean "effectively," the effect is posterior stabilization, not micro-motion. Cross Medical adds that "polyaxial" and "micro-motion" are not synonymous.

The claim recites an "anchor seat means which has a lower bone interface operatively joined to said bone segment." '555 patent, col. 8, ll. 39-42. The claim does not state explicitly whether the "bone interface" and the

"bone segment" must be in contact. However, we may refer to the dictionary to begin understanding the ordinary meaning of these claim terms, "so long as the dictionary definition does not contradict any definition found in or ascertained by a reading of the patent documents." *Phillips*, 415 F.3d at 1322-23 (internal quotations omitted). "Bone" modifies "interface," indicating that the anchor seat has a "lower" portion that may share a "common boundary" with "bone." See *Webster's Third New Int'l Dictionary* 1178 (2002) (defining "interface"). [*27] The term "joined" describes the relationship between the "bone interface" and the "bone segment." Use of the word "joined" indicates that the "interface" and the "bone" must be brought together or connected to form a single unit, a whole, or a continuity, and thus that the interface and the bone are in contact. See *id.* at 1218 (defining "join").

The written description confirms that the interface must contact the bone. The screw is separate from the anchor seat, which prevents the direct transfer of load from the rod to the "bone-screw interface," and decreases the chance of failure of the "bone-screw interface." *Id.*, col. 3, ll. 19-22, ll. 64-67. This use of the term "interface" is consistent with its meaning a "common boundary" between two parts. Moreover, the patent refers to the "anchor" as being held, '555 patent, Abstract, or "secured" to the bone, *id.*, col. 3, ll. 59-60, and to the point of attachment as a "fusion bed," *id.*, col. 7, l. 15. These references suggest contact between the anchor seat and the bone. Furthermore, to adjust the height of the anchor posterior to the bone, the patent teaches the addition of washers that are the same diameter as the anchor [*28] seat. *Id.*, col. 5, ll. 50-57. The [*1306] washers co-act with the anchor seat to function as the bone interface while elevating the seat. If contact with bone were not contemplated, then there would be little need to add washers to elevate the seat. The drawings show contact between the anchor and bone, which is consistent with the description. *Id.*, Figures 3, 14, 17-20. Because the ordinary meaning of "interface" and "joined," as reflected in dictionary definitions and in the overall context of the intrinsic record, leads to the conclusion that a person of ordinary skill in the art would have understood these terms to require "contact" between the interface and the bone, the district court's construction in this regard was correct. It would be improper to construe "joined" more broadly to mean "connected" without requiring contact.

As to "operatively," the term is often used descriptively in patent drafting to mean "effectively" in describing the functional relationship between claimed components. See, e.g., *InnovaPure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1118 (Fed. Cir. 2004) ("[Operatively connected] is a general descriptive [*29] term frequently used in patent drafting to reflect a functional relationship between claimed components."). Here, the preamble of the claim recites that the invention is operative when it effects posterior stabilization of one or more bone segments of the spine. '555 patent, col. 8, ll. 33-34; see *Innova*, 381 F.3d at 1118 (declining to decide whether preamble was an affirmative limitation, but recognizing that preamble recited the intended use corresponding to "operatively"). The body of the claim is consistent as it calls for anchors and a stabilizer rod, and provides detail on how these structures interrelate to stabilize the bone segment. See '555 patent, col. 8, ll. 35-57; *Innova*, 381 F.3d at 1118-19 (looking to the body of the claim to understand the purpose). Although the written description does not define "operatively," it consistently describes the purpose of the device to be for posterior stabilization. See '555 patent, col. 1, ll. 9-12 ("This invention relates generally to an apparatus for immobilization of the spine, and more particularly, to an apparatus for posterior internal fixation of the spine"); *Innova*, 381 F.3d at 1118-19 [*30] (looking to the written description to understand the purpose). It discusses disadvantages of prior art spinal fixation methods and apparatuses, '555 patent, col. 1, ll. 13-64; col. 2, l. 36-col. 3, l. 25, details how the invention's features provide an advantageous fixation system, *id.*, col. 3, l. 26-col. 6, l. 44, and provides a method of spinal fixation therapy for use with the device, *id.*, col. 6, l. 45-col. 7, l. 50. Therefore, from the context of the written description, it is clear that one of ordinary skill in the art would have understood "operatively" to mean effective to produce posterior stabilization. The district court erred in construing "operatively" to mean "surgically." Because the only way a "fixation device" can provide "posterior stabilization" is through a surgical procedure, construing "operatively" to mean "surgically" renders the word superfluous, as used in the claim.

For all of these reasons, we modify the district court's claim construction and conclude that, in claim 5, the "lower bone interface [is] operatively joined to said bone segment" when the interface and the bone segment are connected and in contact such that the device is effective [*31] to perform posterior stabilization.

3. "securing means"

The district court considered the "securing means" limitation to be in § 112, P6 form, and described its function as "applying a force to the rod, which compresses the rod against the anchor seats and secures the rod in place." *Infringement Opinion 2004 U.S. Dist. LEXIS 14183*, [WL] at 6. The district court explained [*1307] that compression must be applied on "either side"--either inside or outside--of the rod-receiving channel. *2004 U.S. Dist. LEXIS 14183*, [WL] at 7. The district court identified the corresponding structure as an "outer nut." *2004 U.S. Dist. LEXIS 14183*, [WL] at 6.

Medtronic argues that the district court's interpretation of the function of the "securing means" somehow ignores the claim language: "through the application of substantially equal compressive forces ...applied on either side along said longitudinal axis of said channel." '555 patent, col. 8, ll. 54-57 (emphasis added). Medtronic asserts that this language mandates that forces be applied along the longitudinal axis of the rod on "either side" of the channel and not on "either side" of the vertical axis. Medtronic interprets "either side" of the channel to be on the "outside" of the channel. Although Medtronic does not dispute [*32] that the corresponding structure is an external nut, Medtronic argues that the written description and prosecution history show a disavowal of equivalents to an external nut.

Cross Medical responds that the district court did not ignore the "either side" limitation, and that, in any event, "either side" can mean that the forces are applied "inside" the channel. Cross Medical provides the illustration that standing on "either side" of the room would connote standing inside the room. Cross Medical adds that the specification and prosecution history do not evince a disavowal, and that claim differentiation doctrine supports structural equivalents.

The claim requires:

at least two anchors and an elongated stabilizer comprising a rod having a diameter and a longitudinal axis ...

securing means which cooperate with each of said anchor seat portions ...said securing means including second threads which cooperate with the first threads of

the seat means to cause said rod to bear against said channel through the application of substantially equal compressive forces by said securing means in the direction of the vertical axis and applied on either side along said longitudinal [*33] axis of said channel.

'555 patent, col. 8, ll. 36-37, 44-57.

We agree with the parties that the limitation is in § 112, P6 format. *See Rodime*, 174 F.3d at 1302 (noting that a concession by the parties that the claim is in § 112, P6 form does not relieve the court of its duty to examine whether § 112, P6 applies). The claim recites "securing means," which gives rise to the presumption that § 112, P6 applies. *See id.* The function is "to cause said rod to bear against said channel through the application of substantially equal compressive forces by said securing means in the direction of the vertical axis and applied on either side along said longitudinal axis of said channel." '555 patent, col. 8, ll. 53-57.

"Either side" does not refer to "either side" of the rod on the vertical axis of the channel perpendicular to the rod, because that interpretation would render the "in the direction of the vertical axis" language redundant. The "and" in the phrase "in the direction of the vertical axis and applied on either side" makes that clear. Therefore, the function is to cause the rod to bear against the rod-receiving channel by applying a compressive [*34] force in the direction of the vertical axis while ensuring that substantially equal forces are applied along the longitudinal axis of the rod on opposite sides--either inside or outside--of the rod-receiving channel.

We must now determine whether the claim recites structure to carry out that function. The claim states that the "securing means ...cooperate with each of said anchor seat portions," *id.*, ll. 44-45, in that the "securing means includes second threads which cooperate with the first threads of the seat means to cause [the [*1308] desired function]," *id.*, ll. 51-57. Although it is the operation of the threads that causes the rod to bear against the channel by applying a compressive force in the direction of the vertical axis, a naked incantation of threads alone does not ensure that substantially equal forces are applied along the longitudinal axis of the rod on opposite sides of the rod-receiving channel. Because there is insufficient structure recited for performing the specified function, §

112, P6 applies. Thus, we construe the claim "to cover the corresponding structure ...described in the specification and equivalents thereof."

The structure for performing the recited [*35] function is described as follows:

The nut 27 includes internal threads 83 which engage the external threaded area 76 on the anchor seat. The nut 27 is a hex nut which can be tightened relative to the seat 25.

As the nut 27 is rotated about the anchor seat 25, it cooperates with the top side of the flange 46,47 to tight en the clamp 25 in relation to the rod support 23. The rod 18 is grasped in the tunnel 84 formed between the rod-receiving channel 54 of the anchor seat 23 and the arch 72 of the cap 25.

The threads 76 on the anchor seat 23 extend downwardly on the seat below the top of the cylindrical surface of the rod 18 as is shown in FIG. 2 and the nut 27 has a relatively constant diameter through the bore as is shown in FIGS. 2 and 4. Accordingly, the nut 27 can be screwed directly onto the anchor seat 23 to compressively hold the rod without the cap 25.

'555 patent, col. 6, ll. 9-24. Figures 5 and 7 depict the rod 18 in the channel created by the anchor seat 23, with the nut 27 securing the rod in place. Thus, the structure that corresponds to the claimed function is a nut with internal threads cooperating with the external threads of the anchor seat (an "external [*36] nut"). The claim covers that structure and equivalents thereof.

We are not persuaded by Medtronic's argument that the written description shows a disavowal of equivalents. Although we need not decide that there can never be a disavowal of § 112, P6 equivalents, " § 6 112 was written precisely to avoid a holding that a means-plus-function limitation must be read as covering only the means disclosed in the specification." *D.M.I., Inc. v. Deere & Co.*, 755 F.2d 1570, 1574 (Fed. Cir. 1985). In this case, the inventors we re merely describing the structure that performs the claimed function.

Nor are we persuaded that the prosecution history shows a disavowal. In an August 4, 1994 Office Action ("*Office Action*"), the Examiner rejected the apparatus claims, in part, under § 112, P1, because "the specification failed to provide an enabling description of the embodiment of the action device excluding the cap/cap means," and because "language directed toward the 'securing means' cooperating with the seat means through application of compressive forces by the securing means" failed to have support in the specification. *Office Action* at 4. Subsequent to that rejection, [*37] an interview was held with the Examiner and the Examiner Interview Summary referred to "securing means" as "i.e., the nut." In addition, Remarks in the April 27, 1995 Amendment ("*Amendment*") stated that Applicant amended the claims "to define the anchor seat means having a channel and threads which cooperate with the securing means (i.e., the nut) so as to capture the stabilizer between the channel and the securing means." *Amendment* at 4. However, Applicant did not add language in claim 5 that limited securing means to a nut. The statements referring to "securing means" as "i.e., the nut" simply help to provide the requisite [*1309] linkage between the function recited in the claim and the "corresponding" structure. *See Default Proof Credit Card Sys., Inc. v. Home Depot U.S. A., Inc.*, 412 F.3d 1291, 1298 (Fed. Cir. 2005) ("A structure disclosed in the specification qualifies as "corresponding" structure only if the specification or prosecution history clearly links or associates that structure to the function recited in the claim."). Applicant did not disclaim all structural equivalents.

Therefore, the district court correctly construed the "securing means" limitation [*38] to refer to the external nut described in the written description. Under § 112, P6, the claim also covers equivalents thereof.

4. "bear against said channel"

The parties dispute whether the language of claim 5 reciting that the "rod ...bears against said channel" precludes the presence of any intervening structure between the rod and the channel. The district court held that "there is nothing in the [language of claim 5] which excludes an anchor channel composed of more than one component part." *Infringement Opinion 2004 U.S. Dist. LEXIS 14183*, [WL] at 8. Medtronic argues that the district court's construction is erroneous, and that by placing a separable crown member over the anchor seat,

Medtronic has prevented the rod from "bearing against [the] channel" as a matter of law. Medtronic asserts that the anchor seat must form the channel and the crown is not part of the anchor seat. Cross Medical responds that claim 5 does not require that the channel of the anchor seat be a unitary component and thus does not preclude a finding that the crown is part of the anchor seat.

The dispute reduces to whether the "channel" must be formed in a unitary structure. The claim requires that the anchor seat means have [*39] "an anchor seat portion spaced apart from said bone interface including a channel to receive said rod," '555 patent, col. 8, ll. 41-42, and that the "securing means ...causes said rod to bear against said channel," *id.*, ll. 51-54. The claim does not state that the anchor seat portion forming the channel is unitary. Although the sole embodiment described in the specification depicts a unitary structure, *id.*, col. 5, ll. 20-21, the mere depiction of a structural claim feature as unitary in an embodiment, without more, does not mandate that the structural limitation be unitary. See *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1367 (Fed. Cir. 2002) (holding that "member" encompassed a multi-component structure where the preferred embodiment showed a single-component structure, but the specification did not otherwise require a certain number of components). There is nothing in the written description or prosecution history that limits the channel to being formed in a single-component structure. Thus, the district court correctly concluded that the "bear against said channel" language of claim 5 does not exclude an "anchor seat portion" composed of multiple [*40] components.

D. Infringement

The district court ruled as a matter of law that the accused devices met the "operatively joined," "securing means," and "bear against said channel" limitations, that Medtronic was a direct infringer, and that alternatively, Medtronic either contributed to infringement or induced infringement. *Infringement Opinion*, 2004 U.S. Dist. LEXIS 14183, [WL] at 4-9. Medtronic appeals.

1. "operatively joined"

The district court held that the accused devices met the "operatively joined" limitation as a matter of law because "the accused device, to be infringing, need only be capable of operating in the [infringing] mode ...actual [infringing] operation in the accused device is not "

required. 2004 U.S. Dist. LEXIS 14183, [WL] at 5-6 [*1310] (quoting *Intel Corp. v. U.S. Int'l Trade Comm'n*, 946 F.2d 821, 832 (Fed. Cir. 1991)). The district court cited *Hilgraeve Corp. v. Symantec Corp.*, 265 F.3d 1336, 1343 (Fed. Cir. 2001), for the proposition that "an accused device may be found to infringe if it is reasonably capable of satisfying the claim limitations, even though it may also be capable of non-infringing modes of operation." *Infringement Opinion*, 2004 U.S. Dist. LEXIS 14183, [WL] at 5. The court explained that [*41] Medtronic's devices "are capable of operative joiner to the bone segment, and are sometimes used in this way." 2004 U.S. Dist. LEXIS 14183, [WL] at 5-6. In response to Medtronic's argument that it could not directly infringe because it did not perform surgery, the district court held that "under 35 U.S.C. § 271 Defendants can be liable for inducing the infringement or for selling a device which constitutes part of the invention." 2004 U.S. Dist. LEXIS 14183, [WL] at 8.

Medtronic argues that it does not itself make an anchor seat which contacts bone and it does not perform surgery. Medtronic asserts that *Intel* and *Hilgraeve* are inapposite and that it cannot be a direct infringer simply because its accused devices are capable of being made into infringing devices by surgeons. Medtronic adds that it does not induce or contribute to infringement because there is no evidence of physicians bringing the receiver member into contact with the bone segment to make the claimed apparatus; because Medtronic does not design the receiver member to contact the bone segment; and because Medtronic instructs surgeons not to place the device into contact with the bone.

Cross Medical counters that to directly infringe, [*42] Medtronic need only make devices that are capable of being converted into infringing devices, citing *Intel*, *Hilgraeve*, and *Bell Communications Research v. Vitalink Communications Corp.*, 55 F.3d 615 (Fed. Cir. 1995). Cross Medical asserts that Medtronic's argument that it does not directly infringe because it does not perform surgery is as superficial as the non-infringement argument concerning the "Commissioner.com" product in *Fantasy Sports Props., Inc. v. SportsLine.com, Inc.*, 287 F.3d 1108 (Fed. Cir. 2002), and therefore must fail. Furthermore, Cross Medical argues that Medtronic's representatives are present in the operating room and thus that Medtronic performs surgery. Alternatively, Cross Medical argues that Medtronic induces infringement because it sells devices to surgeons, designs its anchors to

function when in contact with bone, and intends that surgeons bring the anchor seat into contact with bone; and because surgeons actually bring the anchor seat into contact with bone. Cross Medical asserts that Medtronic is a contributory infringer because it has not proven that there are substantial non-infringing uses.

"Whoever without authorization [*43] makes, uses, offers to sell, or sells any patented invention, within the United States or imports into the United States any patented invention during the term of the patent therefor [directly] infringes the patent." 35 U.S.C. § 271(a) (2000). To prove direct infringement, the plaintiff must establish by a preponderance of the evidence that one or more claims of the patent read on the accused device literally or under the doctrine of equivalents. *Advanced Cardiovascular Sys., Inc. v. SciMed Life Sys., Inc.*, 261 F.3d 1329, 1336 (Fed. Cir. 2001). "Literal infringement requires that each and every limitation set forth in a claim appear in an accused product." *Frank's Casing Crew & Rental Tools, Inc. v. Weatherford Int'l, Inc.*, 389 F.3d 1370, 1378 (Fed. Cir. 2004) (internal citation omitted). Claim 5 of the '555 patent is an apparatus claim. See '555 patent, col. 8, ll. 34-57. We held in Part II. 2 C. *supra* that the "operatively joined" limitation requires that "the interface and the [*1311] bone segment are connected and in contact such that the device is effective to perform posterior stabilization."

In support of its argument [*44] that Medtronic directly infringes, Cross Medical cites evidence that Medtronic's representatives appear in the operating room, identify instruments used by surgeons, and thus in effect "join" the anchor seat to the bone. Cross Medical argues that the situation is analogous to those in which courts have found a party to directly infringe a method claim when a step of the claim is performed at the direction of, but not by, that party. See, e.g., *Shields v. Halliburton Co.*, 493 F. Supp. 1376, 1389 (W.D. La. 1980). However, if anyone makes the claimed apparatus, it is the surgeons, who are, as far as we can tell, not agents of Medtronic. Because Medtronic does not itself make an apparatus with the "interface" portion in contact with bone, Medtronic does not directly infringe.

Nor does *Intel* support a finding of direct infringement. The claim at issue in *Intel* called for a "programmable selection means" and thus required only that an accused device be capable of operating in the enumerated mode. 946 F.2d at 832; see *Fantasy Sports*,

287 F.3d at 1117-18; *High Tech Med. Instrumentation Inc. v. New Image Indus., Inc.*, 49 F.3d 1551, 1555-56 (Fed. Cir. 1995). [*45] Here, the claim does not require that the interface be merely "capable" of contacting bone; the claim has a structural limitation that the anchor seat be in contact with bone. See *Fantasy Sports*, 287 F.3d at 1117-18 (stressing the "programmable" language of the claim at issue in *Intel* and holding that *Intel* "does not stand for the proposition ...that infringement may be based upon a finding that an accused product is merely capable of being modified in a manner that infringes the claims of a patent"); *High Tech*, 49 F.3d at 1555-56 (distinguishing *Intel* based on the permissive language of the claim at issue). Cross Medical would distinguish *High Tech* by asserting that the device in that case had to be physically altered to become infringing, while Medtronic's device need not be altered. However, Cross Medical again fails to recognize that the limitation--the anchor seat being in contact with bone--is absent until the screw and anchor are put in place during surgery.

Bell Communications and *Hilgraeve* are also inapposite. In *Bell Communications*, plaintiff asserted that defendant's product embodied a claimed method, but the [*46] district court granted summary judgment of non-infringement reasoning that the product had non-infringing modes of operation. 55 F.3d at 618-19. In *Hilgraeve*, plaintiff asserted that defendant sold software that, when in operation, infringed plaintiff's method claim, but the district court granted summary judgment of non-infringement based on rationale similar to that in *Bell Communications*. See *Hilgraeve*, 265 F.3d at 1339-40. In both cases on appeal, this court held that the district court had erred by overlooking the rule that "an accused product that sometimes, but not always, embodies a claimed method nonetheless infringes." *Bell*, 55 F.3d at 622-23; accord *Hilgraeve*, 265 F.3d at 1343 ("So too the sale of a device may induce infringement of a method claim even if the accused device is capable of non-infringing modes of operation in unusual circumstances."). However, a rule that governs infringement of a method claim may not always govern infringement of an apparatus claim. See, e.g., *NIP, Inc. v. Research in Motion, Ltd.*, 418 F.3d 1282, 2005 U.S. App. LEXIS 15920 (Fed. Cir. 2005) (distinguishing between method [*47] claims and apparatus claims for the purpose of determining infringement under section 271(a)). To infringe an apparatus claim, the device [*1312] must meet all of the structural limitations. See *Hewlett-Packard Co. v. Bausch & Lomb, Inc.*, 909 F.2d

1464, 1468 (Fed. Cir. 1990) ("Apparatus claims cover what a device is, not what a device does."); *In re Michlin*, 45 C.C.P.A. 1028, 256 F.2d 317, 320, 1958 Dec. Comm'r Pat. 408 (C.C.P.A. 1958) ("It is well settled that patentability of apparatus claims must depend upon structural limitations and not upon statements of function."). In this case, claim 5 is an apparatus claim which contains the structural limitation that the anchor seat contact bone. Cross Medical has not proven that Medtronic makes an apparatus with an anchor seat in contact with bone.

Cross Medical's reliance on *Fantasy Sports* is also misplaced. In *Fantasy Sports*, the apparatus claim called for "[a] computer for playing football." 287 F.3d at 1111. The district court found that the accused "Commissioner.com" product did not infringe because it was a "modifiable software tool," not a computer for playing football. *See id.* at 1118. [**48] We disagreed, holding that Sportsline directly infringed by making or using the apparatus because no reasonable juror could find that the "Commissioner.com" product was not software installed on a computer. *See id.* at 1118-19. Cross Medical argues that the theory that Medtronic does not directly infringe because it does not itself contact the anchor seat to the bone is as superficial as Sportsline's theory that its product was software but not a computer. However, unlike in *Fantasy Sports*, in this case, no reasonable juror could find that the accused infringer itself makes or uses the entire claimed apparatus. The anchor seat of the device does not contact bone until the surgeon implants it.

Because Medtronic is not a direct infringer, we next consider whether Medtronic induces or contributes to infringement. Under § 271(b), "whoever actively induces infringement of a patent shall be liable as an infringer." 35 U.S.C. § 271(b). "In order to succeed on a claim of inducement, the patentee must show, first that there has been direct 'infringement, and 'second, that the alleged infringer knowingly induced infringement and possessed specific [**49] intent to encourage another's "infringement. *MEMC Elec. Materials, Inc. v. Mitsubishi Materials Silicon Corp.*, 420 F.3d 1369, 1378 (Fed. Cir. 2005) (quoting *Minn. Mining & Mfg. Co. v. Chemque, Inc.*, 303 F.3d 1294, 1304-05 (Fed. Cir. 2002)). Under § 271(c), "whoever offers to sell or sells within the United States ...a component of a patented machine, manufacture, combination or composition ...constituting a material part of the invention, knowing the same to be

especially made or especially adapted for use in an infringement of such patent, and not a staple article or commodity of commerce suitable for substantial noninfringing use, shall be liable as a contributory infringer." 35 U.S.C. § 271(b). In order to succeed on a claim of contributory infringement, in addition to proving an act of direct infringement, plaintiff must show that defendant "knew that the combination for which its components were especially made was both patented and infringing" and that defendant's components have "no substantial non-infringing uses." *Golden Blount, Inc. v. Robert H. Peterson Co.*, 365 F.3d 1054, 1061 (Fed. Cir. 2004) [**50] (internal quotations omitted).

As to the predicate act of direct infringement, we conclude that there is a genuine issue of material fact as to whether surgeons infringe by making the claimed apparatus. The only evidence that Cross Medical cites suggesting that the anchor seat contacts bone is the statement of Medtronic's employee, Michael Sherman, during his January 29, 2004 deposition:

[*1313] Q. How far down do you screw the screw initially?

A. Well, it depends. Because if you screw these screws all the way down, they stop rotating. And the rotating around the ball is a feature of the screw. So you lose some of your ability to rotate, or your freedom.

Because the reason these screws have multiple angles is to make it easier to assemble the system in the patient. So if you screw these things down super-tight, you may have--you know, you've eliminated the multiaxial capability of the screw.

So the surgeon in his judgment gets it down, and I like to tell them, as far as they feel comfortable doing and still have some rotation. Because the further in the instrumentation is into the patient, the lower - the closer the instrumentation is to the loads, and thus the lower the bending [**51] moments are on the instrumentation and the less likelihood of metal failure.

Q. In practice, in some instances the screw is screwed down such that the receiver touches the bone; is that right?

A. I'm sure some surgeons do that. And it can touch the bone and still move a little because the bone is elastic. And the tissue right on top of the bone isn't necessarily bone. It's periosteum. It's deformable.

Medtronic counters with an April 22, 2004, declaration from Kevin Foley, M.D., a board certified neurosurgeon, who has performed over 500 operations using Medtronic's allegedly infringing products. Dr. Foley states, in pertinent part, that:

in all of the surgeries I perform using Medtronic Products, I try to minimize or avoid contact of any part of the receiver member to the patient's spinal anatomy to ease the eventual implantation of the rod. I do not count on any type of direct connection between the receiver member and the patient's spine to impart any stability to the spine or to the implant construct. ...

When implanting the Medtronic Products in a patient's spine, any contact between the receiver member and any portion of the patient's anatomy is incidental to [**52] the surgery and not intended to impart any stability to the spine. In fact, when I instruct other spine surgeons in how to implant the Medtronic Products, I tell them that if they tighten down on the bone screw enough to bring the receiver member into engagement with the spine, they should back off the bone screw by one-quarter to one-half turn so as to better enable alignment of the receiver members with the rod.

Thus, Sherman—who is not testifying that he witnessed contact—speculates that some surgeons may bring the receiver member into contact with bone. Dr. Foley confirms that from time to time, "incidental to the surgery," the receiver member comes into contact with bone. However, Dr. Foley also suggests that he "tries to

minimize or avoid contact" and instructs others to "back off the bone screw by one quarter to one-half turn" "if they tighten down on the bone screw enough to bring the receiver member into engagement with the spine."

On the one hand, drawing inferences in favor of Medtronic, a reasonable juror could conclude that the apparatus is not made because, more likely than not, there is no contact between the receiver member and the bone. On the other hand, drawing [**53] inferences in favor of Cross Medical, a reasonable juror could conclude that the apparatus is made by surgeons. Sherman's statements suggest that the device is capable of posterior stabilization when the receiver member contacts bone, and the statements of both Sherman and Dr. Foley suggest that there may be some [*1314] contact between the receiver member and the spine. We leave it to the fact finder to decide whether surgeons directly infringe.

As to inducement, there is a genuine issue of material fact both as to whether Medtronic "knowingly induced infringement" and as to whether Medtronic "possessed specific intent to encourage [the surgeons'] infringement." On the one hand, in the record are Medtronic's "Field Bulletins" instructing surgeons that the proper technique for installation of the Medtronic device is with the receiver member not in contact with the bone. Medtronic asserts that these materials, together with Dr. Foley's statement, show that it had no knowledge that the surgeons made the claimed apparatus and that it had no specific intent to encourage infringement. On the other hand, Cross Medical points to Sherman's statements—that he would instruct surgeons to screw the [**54] receiver member down "as far as they feel comfortable doing and still have some rotation" and that "[the receiver member] can touch the bone and still move a little because the bone is elastic"—as evidence that Medtronic anticipated that surgeons would contact bone and intended that the device function when in contact with bone. Drawing inferences in favor of Medtronic, a reasonable juror could find that Medtronic did not know that surgeons make the claimed apparatus and, moreover, did not specifically intend for surgeons to contact bone with the anchor seat. Drawing inferences in favor of Cross Medical, a reasonable juror could find that Medtronic designed its device to function when the anchor seat contacted bone, anticipated that surgeons would contact the anchor seat to bone, and thus intended for the surgeon to make or use the apparatus as claimed.

As to contributory infringement, there is a genuine issue of material fact as to whether there are substantial non-infringing uses of Medtronic's devices, specifically, uses of the devices with no receiver member-to-bone contact. Drawing inferences in favor of Medtronic, a reasonable juror could conclude, based on Dr. Foley's statements, [**55] that a substantial number of surgeries occur in which the claimed apparatus is not made or used, as surgeons are able to avoid contact between the seat and bone. Drawing inferences in favor of Cross Medical, a reasonable juror might also conclude that in almost every surgery, the claimed apparatus is made or used, as some contact between the receiver member and the bone is incidental.

Therefore, the district court erred in ruling both that there were no genuine issues of material fact as to infringement and that Medtronic infringed as a matter of law.

2. "securing means"

The district court ruled that Medtronic's "set screw" is equivalent to the external nut as a matter of law because it performs compression in "substantially the same way" to achieve "substantially the same result" as the "external nut." *Infringement Opinion, 2004 U.S. Dist. LEXIS 14183, [WL] at 6*. The district court cited testimony that the set screw has opposite points of contact on the rod 180 degrees apart, noted that the screw is intended to be coaxial with the anchor means, and explained that "although Plaintiff does not provide tests showing the magnitude of the force on either side, everything before the Court supports the conclusion [**56] the forces are substantially equal." *2004 U.S. Dist. LEXIS 14183, [WL] at 7*. The district court added that "defendants submitted no evidence to show the forces are not equal." *Id.* The district court reasoned: "viewing the devices themselves and the testimony, it appears Defendants' inner screw meets the limitation applying [**1315] substantially equal compressive forces on either side of the channel." *Id.*

Medtronic argues that a set screw is not equivalent to an external nut as a matter of law, citing *Chiuminatta Concrete Concepts Inc. v. Cardinal Industries, Inc.*, 145 F.3d 1303 (Fed. Cir. 1998). Medtronic notes that the '555 patent's express reference to the use of a set screw to attach a cross-link to the rod, but lack of a reference to a set screw to lock the rod to the anchor seat, is compelling evidence of non-equivalents. In addition, Medtronic

asserts that set screws and external nuts are not interchangeable because set screws apply a "splaying" force to the side walls of the anchor seat while external nuts do not; an external nut applies compressive forces to the rod in a way that bows or bends the rod upwardly in the anchor seat channel while the set screw minimizes this type of load [**57] on the rod; and bowing creates a problem in Medtronic's devices. Medtronic adds that Dr. Puno, an inventor of the '555 patent, testified that a set screw and an external nut were not interchangeable. Medtronic portrays as unsupported the views of Dr. Villarraga, Cross Medical's expert, who opined that the set screw and external nut are interchangeable. Medtronic argues that Cross Medical has offered no evidence that the set screw applies "substantially equal compressive forces" to the rod; and asserts that Michael Sherman offered convincing testimony that they do not. Medtronic asserts that at the least, there is a genuine issue of material fact as to whether the set screw is an equivalent.

Cross Medical argues that a set screw and external nut perform the function of compression in substantially the same way--applying a downward force on a rod achieved by engaging threads of the receiver--to achieve the identical result--securing the rod in the channel; and that *Chiuminatta* is distinguishable. Cross Medical cites evidence that the set screw applies force to opposite sides of the channel. Cross Medical asserts that, because the compression being applied from the set screw to [**58] the rod would be through absolutely equal forces applied on either side of the channel absent machining imperfections and patient physiology, if one were to account for these factors, the forces would be substantially equal. Cross Medical argues that "splaying" and "bowing" do not affect equivalents and that Dr. Villarraga's opinion on interchangeability is properly based on her knowledge of mechanical engineering and her examination of the devices. Cross Medical asserts that Dr. Puno's testimony on interchangeability is irrelevant. Cross Medical argues that Medtronic admitted in *U.S. Patent No. 6,660,004* ("the '004 patent") that the set screw and external nut were interchangeable. Cross Medical additionally asserts that because Medtronic argued that a set screw and external nut are equivalent to invalidate claims of another patent, Medtronic is estopped from asserting that they are not equivalent.

"Literal infringement of a § 112, P6 limitation requires that the relevant structure in the accused device perform the identical function recited in the claim and be

identical or equivalent to the corresponding structure in the "" specification. *Frank's Casing*, 389 F.3d at 1378 [*59] (quoting *Odetics, Inc. v. Storage Tech. Corp.*, 185 F.3d 1259, 1267 (Fed. Cir. 1999)). "Because structural equivalents under § 112, P6 are included within literal infringement of means-plus-function claims, 'the court must compare the accused structure with the disclosed structure, and must find equivalent structure as well as identity of claimed function for the structure.' " *Id.* (quoting *Pennwalt Corp. v. Durand-Wayland, Inc.*, 833 F.2d 931, 934 (Fed. Cir.1987) (en banc) (emphasis omitted)). "This inquiry for equivalent structure under [*1316] § 112, P6 examines whether 'the assertedly equivalent structure performs the claimed function in substantially the same way to achieve substantially the same result' " *Id.* (quoting *Odetics*, 185 F.3d at 1267).

At the outset, we conclude that Medtronic is not estopped from challenging interchangeability. In this case, Medtronic argued that a set screw and external nut are functionally equivalent for purposes of in validating claim 10 of the '237 patent. However, that argument has no bearing on Medtronic's challenge to the interchangeability of a set screw and an external nut with respect [*60] to claim 5 of the '555 patent because the functions of the "securing means" in claim 5 of the '555 patent and claim 10 of the '237 patent are different. Claim 10 does not require the application of substantially equal compressive forces to the rod on either side of the channel. See '237 patent, col. 4, ll. 42-58, ll. 61-63; col. 5, ll. 14-22. Because the positions are not entirely inconsistent, judicial estoppel does not apply. See *Interactive Gift Express, Inc. v. Compuserve Inc.*, 256 F.3d 1323, 1345 (Fed. Cir. 2001) ("[A] party will be judicially estopped from asserting a position on appeal that is directly opposed to a position that the party successfully urged at trial." (internal citations omitted)).

As to the merits, the claimed function has two parts: (1) causing the rod to bear against the channel by applying a compressive force in the direction of the vertical axis; and (2) ensuring that substantially equal forces are applied along the longitudinal axis of the rod on opposite sides--either inside or outside--of the rod-receiving channel. There is no dispute that the set screw applies a compressive force in the direction of the vertical axis. However, [*61] there is a genuine issue of material fact as to whether the set screw applies substantially equal forces on opposite sides of the channel, and thus whether there is identity of function.

On the one hand, Cross Medical cites testimony stating that the v-ring on the bottom of the internal set screws creates two points of contact when the set screws are compressed against the rod; that the two points of contact between the set screw and the rod are 180 degrees apart, separated by the drive in the set screw; and that the set screw is intended to be co-axial with the receiver (but because of manufacturing tolerances is not co-axial). (Sherman Dep. of Jan. 29, 2004, at 137-41; Sherman Dep. of Jan. 30, 2004, at 283-84.) On the other hand, Medtronic cites testimony stating that Sherman did not know if the load on the points of contact on either side of the v-ring were equal; that when the implant is functioning in a patient, the screw takes on additional load from the rod; and that anytime the screw is loaded, load will increase on one side of the plug such that forces on the two sides would be unequal. (*Id.* at 365-66.) Sherman further testified that he did not know if forces would be [*62] equal before the screw and anchor seat were implanted, because manufacturing tolerances might impact the forces. (*Id.* at 366-67.) Drawing inferences in favor of Medtronic, a reasonable juror could find that the forces are not substantially equal on each side of the channel because of manufacturing tolerances and the additional load placed on the screw by the rod when implanted. Crediting Cross Medical's evidence, a reasonable juror could draw an inference based on Sherman's testimony that the forces applied to the rod on either side of the channel are substantially equal.

Moreover, there is a genuine issue of material fact as to whether the set screw accomplishes the claimed function in substantially the same way as the external nut. Medtronic has cited the testimony of [*1317] Dr. Puno stating that he considered using a set screw in 1990 to hold the rod in place but decided against the set screw because of splaying concerns. (Puno Dep. of April 9, 2004, at 32, l. 10-36, l. 24.) Dr. Puno stated that having the side walls of the anchor seat spread apart when the screw was tightened down would be "a bad thing" and "could end up loosening the connection on the rod." (*Id.* at 35, ll. 7-14.) [*63] Although Dr. Puno testified that he thought a set screw and external nut were interchangeable, he qualified his statement when confronted with prior deposition testimony to the opposite effect. (*Id.* at 37, l. 3-41, l. 23.) Dr. Villarraga stated that the structures were interchangeable because they both could compress a rod into a channel, and because other polyaxial devices utilized set screws. (Villarraga Decl. of April 12, 2004, at 2.) However, Dr.

Villarraga neither explained with any specificity why one of ordinary skill in the art at the time the '555 patent issued would believe the structures to be interchangeable, nor did she refer to any testing. (See *id.*) Drawing inferences in favor of Medtronic, a reasonable juror could find that the set screw does not compress the rod in substantially the same way based on Dr. Puno's testimony about the potential for splaying and his conscious decision to avoid the set-screw design. Drawing inferences in favor of Cross Medical, a reasonable juror could find that the set screw compresses the rod in substantially the same way because both employ threads as a compression mechanism, and some statements of Drs. Puno and Villarraga support [*64] a finding of interchangeability.

We thus disagree with Medtronic that the equivalents question should be removed from the trier of fact under *Chiuminatta*. In that case, we held that no reasonable juror could conclude that the differences between "soft round wheels" and a "skid plate" were insubstantial. *Chiuminatta*, 145 F.3d at 1310. One of the many reasons that we found no equivalents as a matter of law was that the patent at issue discussed the use of wheels for another function, but never disclosed that wheels could perform the same function as the skid plate. *Id.* In this case, although Medtronic may argue that the fact finder should draw an inference of no interchangeability based on the inventors' explicit reference to set screws to form a cross-link, see '555 patent, col. 6, ll. 25-44, and their failure to explicitly recognize set screws as a means for securing the anchor to the bone, we must draw inferences in favor of Cross Medical in evaluating Medtronic's cross-motion for summary judgment. As discussed *supra*, we believe that the issue of interchangeability should be left for the trier of fact.

We also reject the other arguments that both [*65] sides make in attempting to prevail on equivalents as a matter of law. First, we reject Cross Medical's argument that the '004 patent serves as an admission on interchangeability. Even though the '004 patent, which is assigned to an entity related to Medtronic, suggests that an "internally-threaded nut" is interchangeable with "a set screw or internal plug," '004 patent, col. 8, ll. 10-32, that patent issued in 2003 and is irrelevant to known interchangeability in 1995, when the '555 patent issued. See *Al-Site*, 174 F.3d at 1320 ("[A] structural equivalent under § 112 must have been available at the time of the issuance of the claim."). Second, we reject Medtronic's

contentions that the lack of "bowing" with the set screw and the evidence that the external nut does not function to cause "bowing" in Medtronic's device are relevant to interchangeability. Even if the external nut causes "bowing" in Medtronic's device, it is immaterial to the equivalents analysis because "prevention of bowing" is not a limitation of claim 5. See *Micro Chem.*, 194 F.3d at 1258 [*1318] (cautioning against adopting a function different from that explicitly recited in the claim). [*66] Furthermore, although Medtronic argues that the external nut may not work well in Medtronic's products, any impact this might have on the interchangeability analysis is undercut by a lack of evidentiary support.

In summary, we conclude that there is a genuine issue of material fact with respect to whether a set screw is equivalent to an external nut. Thus, the district court erred in deciding equivalents as a matter of law.

3. "bear against said channel"

Relying on its holding that the channel of the anchor seat could comprise more than one component, the district court ruled that, even if the crown is free-floating and not physically joined to the anchor seat because there is no lock between the crown and the screw, Medtronic's devices met the "bear against said channel" limitation as a matter of law. *Infringement Opinion*, 2004 U.S. Dist. LEXIS 14183, [WL] at 7-8. The district court considered evidence that the crown member is physically joined to the anchor seat because it cannot be removed without breaking the screw. *Id.* The district court analogized the crown in Medtronic's devices to a "pressure disk"--which was physically between the rod and the anchor seat--that the district court previously had [*67] held met the "bear against the channel" limitation in *Cross Med. Prods. v. Depuy Acromed, Inc.*, 2002 U.S. Dist. LEXIS 27884, No. SA CV 00-876-GLT (ANx), (C.D. Cal. Feb. 11, 2002), *Infringement Opinion* at 7.

Medtronic argues that even if the anchor seat can be comprised of multiple components, as a matter of fact, the crown member in its accused devices is not part of the channel formed by the anchor seat and, thus, the rod does not bear against the channel as recited in the claim. Medtronic asserts that the crown is free floating and not physically or otherwise joined to the receiver; that the crown is either screwed or slid into the receiver; and that the crown is retained either by a snap ring or by interrupting the threads on the receiver after the crown is screwed into the receiver. Medtronic adds that the

presence of the crown between the rod and the bone screw causes the receiver member to become rigidly locked to the screw, which serves a different function than a channel absent a crown member.

Cross Medical counters that there is nothing to preclude a finding that the crown is part of the anchor seat. Cross Medical argues that the crown member is part of the channel formed by the anchor [**68] seat because the crown is assembled into the device before it is sold, and cannot be removed without damaging the device. Cross Medical asserts that the crown is physically joined to the receiver, and adds that any difference in function is irrelevant because claim 5 has no functional limitation.

There is a genuine issue of material fact as to whether the "bear against [the] channel" limitation is met by the accused products. Sherman testified that in one product, "the crown member is threaded and screws down into the receiver member until it passes the threads of the receiver member and then floats freely until locked down by the rod." (Sherman Decl. of April 23, 2004, at 3.) Sherman stated that in other products, "the crown member is maintained in the receiver member by a snap ring that is designed to allow the crown 'member' to float or move freely within a limited range" before being locked down by the rod. (*Id.*) Sherman added that the rod touches only the crown member in each of Medtronic's products. (*Id.* at 3-4.) Viewing this evidence in the light most favorable to Medtronic, a reasonable juror could conclude that the rod bears only against the crown member, [*1319] which [**69] is separate from the channel in the anchor seat, and thus the rod does not "bear against" the channel of the anchor seat.

However, a reasonable juror could also find that the crown member is a part of the channel, and thus that the rod bears against the channel. Cross Medical cites to evidence that the screw, crown, snap ring, and receiver are assembled as one unit before the implant arrives to the surgeon. (Sherman Dep. of Jan. 29, 2004, at 123.) Cross Medical also cites evidence that the snap ring, which holds the crown member loosely in place, is damaged if the implant is disassembled. (*Id.* at 247.) And we agree with Cross Medical that the function served by the crown member is irrelevant to finding that this structural limitation is met. See *Amstar Corp. v. Envirotech Corp.*, 730 F.2d 1476, 1482 (Fed. Cir. 1984) ("Modifications by mere addition of elements of function ...cannot negate infringement").

Because there is a genuine issue of material fact as to whether the "bear against [the] channel" limitation is met, the district court erred in ruling that the accused devices met this limitation as a matter of law.

E. Invalidity

The district court [**70] granted Cross Medical's cross-motion for partial summary judgment on all invalidity defenses raised by Medtronic with respect to claim 5 of the '555 patent, including indefiniteness, anticipation, and obviousness. Medtronic appeals each of these rulings.

1. Indefiniteness

As noted in Part II. C. 3 *supra*, Medtronic argued that the district court erroneously interpreted the function of the "securing means" to require that equal forces be applied along the longitudinal axis of the channel on "either side" of the vertical axis. Medtronic asserted that the district court's interpretation would leave "said longitudinal axis" without a sufficient antecedent basis and render claim 5 indefinite. We construed the function of the "securing means" limitation as "to cause the rod to bear against the rod-receiving channel by applying a compressive force in the direction of the vertical axis, while ensuring that substantially equal forces are applied along the longitudinal axis of the rod on opposite sides--either inside or out side--of the rod-receiving channel." We agreed with Medtronic that the antecedent basis for "said longitudinal axis" was by implication the longitudinal axis of the [**71] rod. See *Slimfold Mfg. Co. v. Kinkead Indus., Inc.*, 810 F.2d 1113, 1116 (Fed. Cir.1987) (noting that an antecedent basis can be present by implication). Because the "said longitudinal axis" limitation is not lacking in antecedent basis, we conclude that the district court did not err in granting Cross Medical's motion for summary judgment that claim 5 is not indefinite.

2. Anticipation

The district court held that claim 5 was not anticipated as a matter of law because claim 5 covers only polyaxial screws and the two prior art references asserted to be anticipating--U.S. Patent No. 4,763,644 to Webb ("the '644 patent") and the "Bryd-Transpedicular Spinal Fixator"--disclose only monoaxial screws. *Invalidity Opinion*, 2004 U.S. Dist. LEXIS 27644, [WL] at 5. Medtronic's arguments on anticipation turn entirely

upon whether claim 5 covers monoaxial screws. Because we determined in Part II. C. 1 *supra* that claim 5 does not cover monoaxial screws, we conclude that the district court did not err in granting Cross Medical's motion for partial summary judgment that claim 5 is not anticipated.

3. Obviousness

In the district court, Medtronic contended that claim 5 was obvious in view of the '602 patent, [*72] the '644 patent, and the [*1320] Byrd device. *Invalidity Opinion*, 2004 U.S. Dist. LEXIS 27644, [WL] at 6. The parties agreed that the '602 and '644 patents were prior art, but the district court held that because Dr. Puno, an inventor on the '555 patent, also invented the closure mechanism of the Byrd device, the Byrd device was not prior art. 2004 U.S. Dist. LEXIS 27644, [WL] at 6. Focusing on the '602 and '644 patents, the district court explained that the '602 patent and the '555 patent are both polyaxial spinal implant devices. *Id.* The district court noted that "the only major difference between the '602 patent and the '555 is the '602 device is tightened from the bottom and the '555 is a top-loading nut," but that "the '644 patent covers a top-loading monoaxial spinal implant device." 2004 U.S. Dist. LEXIS 27644, [WL] at 7. However, the district court held that there was no motivation to combine the '602 and '644 references, relying on its prior ruling in *Cross Medical Products, Inc. v. DePuy AcroMed, Inc.*, 2003 U.S. Dist. LEXIS 26720, No. SA CV 00-876-GLT(ANx) (C.D. Cal. Jan. 9, 2003).

In *AcroMed*, the defendant had argued that "the top-loading nut would have been obvious in light of the problem to be solved, i.e., surgeons having difficulty tightening the bottom-loading nuts during [*73] implantation." *Invalidity Opinion*, 2004 U.S. Dist. LEXIS 27644, [WL] at 7. The district court "found AcroMed failed to show motivation to combine because 'the problem was not discovered by looking at the prior art or the patent itself....It was only discovered when doctors tried to use the product.'" *Id.* The court cited *In re Spinnoble*, 56 C.C.P.A. 823, 405 F.2d 578, 585 (C.C.P.A. 1969), for the proposition that "a patentable invention may lie in the discovery of the source of a problem even though the remedy may be obvious once the source of the problem is identified." *Invalidity Opinion*, 2004 U.S. Dist. LEXIS 27644, [WL] at 7.

The district court found that Medtronic offered no evidence that the problem was disclosed in the prior art. *Id.* The district court noted that "Defendants cite only the

'555 patent to describe the problem the '555 patent sought to fix." *Id.* The district court explained that "although Defendants argue the clinical investigators identified the problem with the bottom-loading nut, the investigators' letters are not prior art." *Id.* The district court acknowledged that "motivation to combine need not be explicit in the prior art; it can be implicit in the knowledge of one of skill in the art." *Id.* (quoting *Nat'l Steel Car, Ltd. v. Canadian Pac. Ry., Ltd.*, 357 F.3d 1319, 1337 (Fed. Cir. 2004)), but reasoned that "this rule does not change the result in this case because it does not relate to identification of the problem," 2004 U.S. Dist. LEXIS 27644, [WL] at 7. The district court then denied Medtronic's motion for summary judgment on obviousness and granted Cross Medical's cross motion. 2004 U.S. Dist. LEXIS 14183, [WL] at 7-8.

Medtronic argues that it presented sufficient evidence that the bottom-tightening-nut problem was known to those of ordinary skill in the art and that this provides a motivation to combine the '644 and '602 references. Medtronic cites communications from clinical investigators as evidence of recognition of the problem by those of ordinary skill in the art, and argues that the district court's analysis and adoption of the reasoning in *Spinnoble* were in error. In addition, Medtronic cites: (a) the '644 patent as evidence that bottom-tightening devices then available were problematic to assemble in situ; (b) U.S. Patent No. 5,261,913 ("the '913 patent") as evidence that it was within the knowledge of one of ordinary skill to use a top-tightening nut; and (c) the '555 patent [*75] as evidence that prior art polyaxial screws designed with bottom-tightening nuts were awkward.³ Medtronic argues that even if [*1321] the '913 patent does not qualify as prior art, it evidences knowledge of one of ordinary skill in the art. Medtronic asserts that, at the least, this evidence is enough to create a genuine issue of material fact on motivation to combine.

3 In a footnote in its opening brief, Medtronic asserts that the district court erroneously resolved a fact question as to whether Dr. Puno was an inventor of the Byrd device but never requests relief or provides record cites for its assertions. Medtronic makes no other reference to the Byrd device with respect to obviousness in its opening brief. In its response brief, Medtronic asserts that even if Dr. Puno is a joint inventor of the Byrd device, there is a different set of joint inventors on the Byrd device--Drs. Puno and Byrd--than on the

'555 patent--Dr. Puno and Mellinger. Medtronic argues that the two sets of inventors are separate legal entities under *In re Kaplan*, 789 F.2d 1574, 1575 (Fed. Cir. 1986), and that the Bryd device may be prior art under §§ 102(f) and 103. Medtronic adds that even if the Bryd device is confidential, it evidences knowledge of those of ordinary skill.

Medtronic has not properly raised the inventorship issue in its opening brief to warrant relief from this court. See *Fuji Photo Film Co. v. Jazz Photo Corp.*, 394 F.3d 1368, 1375 n.4 (Fed. Cir. 2005) (holding that this court will not address arguments that are not properly raised in the opening brief). Nor will this court consider Medtronic's new arguments raised for the first time in its reply brief. *Id.*

[**76] Cross Medical counters that Dr. Puno was one of the clinical investigators who recognized the problem with the '602 device, that Dr. Puno discovered the problem as part of his inventive process, and thus that the clinical investigators' recognition of the problem is not evidence of a motivation to combine. Cross Medical argues that the '644 patent does not itself provide reason to apply its teachings to modify the '602 device because it discusses prior art assembly problems related to use of a locking nut and threaded rod to hold the screw. Cross Medical argues that the '602 device did not use a threaded rod with a locking nut, and thus the inventors did not confront the same problem as confronted by the inventors of the '644 device. Cross Medical asserts that the '913 patent cannot evidence knowledge of ordinary skill in the art at the time of the invention because the application that matured into the '913 patent was filed two months after the invention date of the '555 patent, and that application was not published for 18 months. Cross Medical cites differences between the '602 and '555 patents in addition to the bottom-tightening nut, and asserts that Medtronic submitted no evidence [**77] explaining how the particular structural elements of the '602 device could be modified to achieve the structure disclosed in claim 5 as a whole. Cross Medical argues that Medtronic failed to discuss "trade-offs" to the use of the top-tightening device, and neglected to discuss secondary considerations.

"A claimed invention is unpatentable if the differences between it and the prior art are such that the

subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art." *In re Kotzab*, 217 F.3d 1365, 1369 (Fed. Cir. 2000); see 35 U.S.C. § 103. An invention may be a combination of old elements disclosed in multiple prior art references. *Kotzab*, 217 F.3d at 1369. In determining whether a combination of old elements is non-obvious, the court must assess whether, in fact, an artisan of ordinary skill in the art at the time of invention, with no knowledge of the claimed invention, would have some motivation to combine the teachings of one reference with the teachings of another reference. See *In re Fulton*, 391 F.3d 1195, 1200-02 (Fed. Cir. 2004). Motivation [**78] to combine references "may come explicitly from statements in the prior art, the knowledge of one of ordinary skill in the art, or, in some cases the nature of the problem to be solved." *Kotzab*, 217 F.3d at 1370. "The test for an implicit teaching is what the combined references, knowledge of one of ordinary skill [**1322] in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art." *Id.*

The sole issue before us is whether the district court erred in ruling that there is no genuine issue of material fact as to whether the subject matter as a whole would have been obvious to one of ordinary skill in the art at the time of the invention based on the absence of any evidence of a motivation to combine the '602 and '644 references. We conclude that a genuine issue of material fact exists with respect to motivation to combine. Cross Medical designated the screw disclosed in the '602 patent as the "PWB I" and performed a pilot study testing its use in humans. A paper, entitled "The Puno-Winter-Bird (PWB) Spinal System for Transpedicular Fixation of the Lumbar Spine," recounted that surgeons participating in the [**79] pilot study found the implant design "tedious," and that it was "technically difficult to position the wrench when the nut was tightened, since it required that the nut be advanced from under the rod." The paper explained that "although [the PWB I] provided satisfactory fixation of the rod, the design was not 'user'-friendly." The paper noted that "[a] design improvement was in order and led to the development of the PWB II." Other evidence in the record confirms that surgeons in the pilot study recognized the problem and requested changes. The surgeons who participated in the pilot included investigators other than inventors of the '555 patent.

From this evidence, a reasonable juror could conclude that at the time of the invention, one of ordinary skill in the art could have been motivated to modify the PWB I in light of the problem to be solved. Giving credit to Medtronic's evidence, the clinical investigators recognized the bottom-tightening problem with the '602 device and proposed changes. The problem was within the general knowledge of those of ordinary skill in the art, and thus provided sufficient motivation to navigate the prior art in the spinal implant field in search [*80] of a teaching on how one might modify the '602 device away from a bottom-tightening assembly.

The district court erred in discounting the clinical investigators' recognition of the problem. "It has long been the law that the motivation to combine need not be found in prior art references, but equally can be found 'in the knowledge generally available to one of ordinary skill in the ' art. *Nat'l Steel*, 357 F.3d at 1337 (quoting *In re Jones*, 958 F.2d 347, 351 (Fed. Cir. 1992)). Evidence of a motivation to combine references need not be in the form of prior art. *See id.* at 1338-39. Evidence that a person of ordinary skill in the art recognized the same problem to be solved as the inventor and suggested a solution is, at the least, probative of a person of ordinary skill in the art's willingness to search the prior art in the same field for a suggestion on how to solve that problem. *See Pro-Mold & Tool Co. v. Great Lakes Plastics, Inc.*, 75 F.3d 1568, 1573 (Fed. Cir. 1996) (Motivation to combine "may also come from the nature of a problem to be solved, leading inventors to look to references relating to possible solutions to that [*81] problem." (citing *Application of Rinehart*, 531 F.2d 1048, 1054 (C.C.P.A. 1976)); *In re Huang*, 100 F.3d 135, 139 n.5 (Fed. Cir. 1996) (stating that problem well-known to a person of ordinary skill in the art would have directed that person of ordinary skill to the reference teaching the missing elements); *see also*, e.g., *In re Gartside*, 203 F.3d 1305, 1320-21 (Fed. Cir. 2000) (recognizing that motivation to combine can come from the nature of the problem to be solved); *In re Rouffet*, 149 F.3d 1350, 1355 (Fed. Cir. 1998) (*same*). To the extent that the district court determined [*1323] that the only investigators who recognized the problem of the bottom-tightening assembly were inventors on the '555 patent, that conclusion has no basis in the record.

Furthermore, the district court's reliance on *Sponnoble* is misplaced. In that case, those of ordinary skill in the art of packaging pharmaceutical products

recognized a moisture-transfer problem with "structure[s] for temporarily isolating a compartment containing a solid pharmaceutical product from a compartment containing an aqueous solution." *Sponnoble*, 405 F.2d at 585. [*82] The industry believed that moisture was transmitted around the plug separating the two compartments. *Id.* at 586. *Sponnoble* discovered that moisture traveled through the plug and remedied that problem with a solution available in the prior art. *Id.* Our predecessor court held that the invention was non-obvious because one of ordinary skill in the art would not have chosen the solution without recognizing the true cause of the problem, and "the cause of the problem [was] not suggested by the prior art." *Id.* In this case, however, the problem was known to the clinical investigators at the time of the invention, and thus, unlike *Sponnoble*, the problem was within the general knowledge of one of ordinary skill in the art. *See Nat'l Steel*, 357 F.3d at 1338 ("Something that has already been rendered obvious to a newcomer in the field is probative of what would be obvious to someone who has been around for a longer period of time."). If the problem is within the knowledge of one of ordinary skill in the art, then it is irrelevant that the prior art does not disclose the problem. *See id.* at 1337-39.

Moreover, we conclude--after drawing [*83] inferences in favor of Medtronic--that the '644 patent itself may have provided sufficient motivation for one of ordinary skill to have considered its teachings and altered the '602 device. The '644 invention was an improvement over prior art spinal implant devices which used a threaded rod with locking nuts. In characterizing the prior art, the patent states that "the need to thread the nut along the rod results in the device being rather slow to assemble and can result in damage to soft tissue if carried out in situ." '644 patent, col. 2, ll. 10-12. The solution was, in part, a top-tightening nut. *See id.*, col. 3, ll. 16-23; *id.*, Figure 2. Thus, the '644 patent discusses a problem posed by the assembly of certain spinal stabilization devices in situ and a solution. Confronted with the implantation problem of the '602 device, one of ordinary skill might have found the problem solved by the '644 patent sufficiently analogous to have been motivated to apply its teachings. In turn, we reject Cross Medical's contention that the '644 device cannot provide the requisite motivation because the problem it addressed may have differed slightly from the problem encountered by surgeons [*84] using the '602 device. One of ordinary skill in the art need not see the identical problem

addressed in a prior art reference to be motivated to apply its teachings. See *In re Oetiker*, 977 F.2d 1443, 1448 (Fed. Cir.1992) (Nies, C.J., concurring) ("Such suggestion or motivation to combine prior art teachings can derive solely from the existence of a teaching, which one of ordinary skill in the art would be presumed to know, and the use of that teaching to solve *the same or similar problem* which it addresses." (citing *In re Wood*, 599 F.2d 1032, 1037 (C.C.P.A. 1979)) (emphasis added)); cf. *In re Dillon*, 919 F.2d 688, 694 (Fed. Cir.1990) (en banc) ("[A reference is not from a non-analogous art if] the reference is reasonably pertinent to the particular problem with which the inventor was " involved. (quoting *In re Deminski*, 796 F.2d 436, 442 (Fed. Cir. 1986) (quoting in turn from *Wood*, 599 F.2d at 1036))).

[*1324] As to the other evidence cited by Medtronic, the '555 patent suggests that the inventor recognized the problem of bottom-tightening. However, the patent does not provide evidence that the [*85] problem was within the knowledge of those of ordinary skill in the art at the time of the invention; or that the problem was disclosed in the prior art. The '913 patent is also of limited relevance because it issued after the invention date. See *Mahurkar v. C.R. Bard, Inc.*, 79 F.3d 1572, 1576-77 (Fed. Cir. 1996).

Thus, we conclude that, because there are genuine issues of material fact on the underlying facts related to obviousness, the grant of summary judgment was in

error.

III. CONCLUSION

We conclude that we have jurisdiction over this appeal. We affirm the district court's construction of the "anchoring means," "securing means," and "bear against said channel" limitations, but modify the district court's construction of the "operatively joined" and the "anchor seat means" limitations. Because we find genuine issues of material fact regarding infringement, we reverse the grant of Cross Medical's motion for partial summary judgment of infringement and find no abuse of discretion in the denial of Medtronic's cross-motion for partial summary judgment of non-infringement. We also reverse the grant of Cross Medical's motion for partial summary judgment that claim [*86] 5 is not obvious but affirm the grant of that motion as to indefiniteness and anticipation. We further conclude that the district court did not abuse its discretion in denying Medtronic's cross-motion for summary judgment as to these invalidity issues. As a result, we vacate the permanent injunction. We remand for further proceedings consistent with this opinion.

AFFIRMED-IN-PART, REVERSED-IN-PART,
VACATED-IN-PART, AND REMANDED.

COSTS

Costs to Medtronic.

LEXSEE 425 U.S. 219

DANN, COMMISSIONER OF PATENTS AND TRADEMARKS v. JOHNSTON

No. 74-1033

SUPREME COURT OF THE UNITED STATES

425 U.S. 219; 96 S. Ct. 1393; 47 L. Ed. 2d 692; 1976 U.S. LEXIS 95; 189 U.S.P.Q.
(BNA) 257

Argued December 9, 1975
March 31, 1976

PRIOR HISTORY: CERTIORARI TO THE
UNITED STATES COURT OF CUSTOMS AND
PATENT APPEALS

automatic data processing system for use in a large
business organization to record information as to
transactions in each department of the organization.

Blackmun and Stevens, JJ., did not participate.

SUMMARY:

A patent was sought for a computer system for automatic record keeping of bank checks and deposits, permitting a bank--by using machine readable checks and deposit slips, bearing numerical category codes for various types of expenditures and sources of deposited funds--to furnish a customer with subtotals for each category of transactions conducted through the customer's single bank account. Both a patent examiner and the Patent and Trademark Office Board of Appeals rejected the patent application on various grounds, including obviousness under 103 of the Patent Act (35 *USCS* 103), which provides that a patent may not be obtained if the subject matter would have been obvious at the time the invention was made to a person having ordinary skill in the applicable art. The United States Court of Customs and Patent Appeals reversed the Board's decision, holding that the patent applicant's system was not obvious under prior art (502 *F.2d* 765).

On certiorari, the United States Supreme Court reversed and remanded. In an opinion by Marshall, J., expressing the unanimous view of the seven participating members of the court, it was held that the applicant's computer system was unpatentable under 103 of the Patent Act as being obvious to one reasonably skilled in the applicable art, in view of the prior art with regard to (1) the nature of the current use of data processing equipment and computer programs in the banking industry, and (2) an earlier patent to another person for an

LAWYERS' EDITION HEADNOTES:

[***LEdHN1]

PATENTS §19.1

obviousness -- computer system for banks --

Headnote:[1A][1B][1C]

A computer system for automatic record keeping of bank checks and deposits, permitting a bank--by using machine readable checks and deposit slips bearing numerical category codes for various types of expenditures and sources of deposited funds--to furnish a customer with subtotals for each category of transactions conducted through the customer's single bank account, is unpatentable under 103 of the Patent Act (35 *USCS* 103) as being obvious to one reasonably skilled in the applicable art, in view of the prior art with regard to (1) the nature of the current use of data processing equipment and computer programs in the banking industry, and (2) an earlier patent to another person for an automatic data processing system for use in a large business organization to record detailed information as to transactions in each department of the organization.

[***LEdHN2]

PATENTS §19.1

obviousness -- relevant factors --

Headnote:[2]

Under 103 of the Patent Act (*35 USCS 103*)--which provides that a patent may not be obtained if the subject matter would have been obvious at the time the invention was made to a person having ordinary skill in the applicable art--the central factors relevant to any inquiry into obviousness are (1) the scope and content of the prior art, (2) the differences between the prior art and the claims at issue, and (3) the level of ordinary skill in the pertinent art.

[***LEdHN3]

PATENTS §19.1

obviousness -- prior art --

Headnote:[3]

Under 103 of the Patent Act (*35 USCS 103*)--which provides that a patent may not be obtained if the subject matter would have been obvious at the time the invention was made to a person having ordinary skill in the applicable art--the "obviousness" test is not one which turns on whether an invention is equivalent to some element in the prior art but rather whether the difference between the prior art and the subject matter in question is sufficient to render the claimed subject matter unobvious to one skilled in the applicable art.

[***LEdHN4]

PATENTS §19.1

obviousness -- person skilled in art --

Headnote:[4]

In making a determination of "obviousness" under 103 of the Patent Act (*35 USCS 103*)--which provides that a patent may not be obtained if the subject matter would have been obvious at the time the invention was made to a person having ordinary skill in the applicable art--the criteria is measured not in terms of what would be obvious to a layman, but rather what would be obvious to one reasonably skilled in the applicable art.

[***LEdHN5]

PATENTS §19.1

obviousness -- prior art --

Headnote:[5]

The mere existence of differences between the prior art and an invention does not establish the invention's nonobviousness for purposes of 103 of the Patent Act (*35 USCS 103*), which provides that a patent may not be obtained if the subject matter would have been obvious at the time the invention was made to a person having ordinary skill in the applicable art.

[***LEdHN6]

PATENTS §18

commercial success -- obviousness --

Headnote:[6A][6B]

Although commercial success without invention will not make patentability, nevertheless secondary considerations such as commercial success, long felt but unsolved needs, and failure of others may be relevant in a determination of obviousness under 103 of the Patent Act (*35 USCS 103*), which provides that a patent may not be obtained if the subject matter would have been obvious at the time the invention was made to a person having ordinary skill in the art.

SYLLABUS

Respondent's "machine system for automatic record-keeping of Sbank checks and deposits," under which checks and deposits are customer-labeled with code categories which are "read," and then processed by a data processor, such as a programmable electronic digital computer, having data storage files and a control system, permitting a bank to furnish a customer with an individual and categorized breakdown of his transactions during the period in question, *held* unpatentable on grounds of obviousness. *35 U.S.C. § 103*. Pp. 225-230.

502 F. 2d 765, reversed and remanded.

MARSHALL, J., delivered the opinion of the Court, in which all Members joined except BLACKMUN and STEVENS, JJ., who took no part in the consideration or decision of the case.

COUNSEL: *Howard E. Shapiro* argued the cause for petitioner. With him on the brief were *Solicitor General*

Bork, Assistant Attorney General Kauper, Gerald P. Norton, Richard H. Stern, and Karl E. Bakke.

Morton C. Jacobs argued the cause and filed a brief for respondent. *

* *John S. Voorhees* and *Kenneth E. Krosin* filed a brief for the Computer & Business Equipment Manufacturers Assn. as *amicus curiae* urging reversal.

Briefs of *amici curiae* urging affirmance were filed by *Carol A. Cohen* for Applied Data Research, Inc.; by *David Cohen* for the Association of Data Processing Service Organizations, Software Industry Assn.; and by *Charles Winn Sims* and *Francis Noel Carten* for Universal Software, Inc.

Briefs of *amici curiae* were filed by *Richard E. Kurtz*, *Jack C. Goldstein*, and *Arthur R. Whale* for the American Patent Law Assn.; by *Reed C. Lawlor*, *Theodore H. Lassagne*, *David E. Lovejoy*, and *John P. Sutton* for the California Patent Law Assn.; by *James W. Geriak* and *John C. Dorfman* for the Los Angeles and Philadelphia Patent Law Assns.; and by *Mr. Lawlor* for Software Associates, Inc.

JUDGES: BURGER, BRENNAN, STEWART, WHITE, MARSHALL, POWELL, REHNQUIST; BLACKMUN AND STEVENS took no part in the consideration or decision of the case.

OPINION BY: MARSHALL.

OPINION

[*220] [***694] [*1394] MR. JUSTICE MARSHALL delivered the opinion of the Court.

Respondent has applied for a patent on what is described in his patent application as a "machine system for automatic record-keeping of bank checks and deposits." The system permits a bank to furnish a customer with subtotals of various categories of transactions completed in connection with the customer's single account, thus saving the customer the time and/or expense of conducting this bookkeeping himself. As respondent has noted, the "invention is being sold as a computer program to banks and to other data processing

companies so that they can perform these data processing services for depositors." Brief for Respondent 19A; *Application of Johnston*, 502 F. 2d 765 (CCPA 1974).

[***695] [***LEdHR1A] [1A]Petitioner and respondent, as well as various *amici*, have presented lengthy arguments addressed to the question of the general patentability of computer programs. Cf. *Gottschalk v. Benson*, 409 U.S. 63 (1972). We find no need to treat that question in this case, however, because we conclude that in any event respondent's system is unpatentable on grounds of obviousness. 35 U.S.C. § 103. Since the United States Court of Customs and Patent Appeals (CCPA) found respondent's system to be patentable, *Application of Johnston*, *supra*, the decision of that court is accordingly reversed.

I

While respondent's patent application pertains to the highly esoteric field of computer technology, [*221] the basic functioning of his invention is not difficult to comprehend. Under respondent's system a bank customer labels each check that he writes with a numerical category code corresponding to the purpose for which the funds are being expended. For instance, "food expenditures" might be a category coded "123," "fuel expenditures" a category coded "124," [*1395] and "rent" still another category coded "125." Similarly, on each deposit slip, the customer, again through a category code, indicates the source of the funds that he is depositing. When the checks and deposit slips are processed by the bank, the category codes are entered upon them in magnetic ink characters, just as, under existing procedures, the amount of the check or deposit is entered in such characters. Entries in magnetic ink allow the information associated with them to be "read" by special document-reading devices and then processed by data processors. On being read by such a device, the coded records of the customer's transactions are electronically stored in what respondent terms a "transaction file." Respondent's application describes the steps from this point as follows: S>To process the transaction file, the... system employs a data processor, such as a programmable electronic digital computer, having certain data storage files and a control system. In addition to the transaction file, a master record-keeping file is used to store all of the records required for each

customer in accordance with the customer's own chart of accounts. The latter is individually designed to be the customer's needs and also constructed to cooperate with the control system in the processing of the customer's transactions. The control system directs the generation of periodic output [*222] reports for the customer which present the customer's transaction records in accordance with his own chart of accounts and desired accounting procedures." Pet. for Cert. 4A-5A.1

Thus, when the time comes for the bank customer's regular periodic statement to be rendered, the programmed computer sorts out the entries in the various categories and produces a statement which groups the entries according to category and which gives subtotals for each category. The customer can then quickly see how much he spent or received in any given category during the period in question. Moreover, according to respondent, the system can "[adapt] to whatever variations [***696] in ledger format a user may specify." Brief for Respondent 66.

In further description of the control system that is used in the invention, respondent's application recites that it is made up of a general control and a master control. The general control directs the processing operations common to most customers and is in the form of a software computer program, *i.e.*, a program that is meant to be used in a general-purpose digital computer. The master control, directing the operations that vary on an individual basis with each customer, is in the form of a separate sequence of records for each customer containing suitable machine-instruction mechanisms along with the customer's financial data. Respondent's application sets out a flow chart of a program compatible with an IBM 1400 computer which would effectuate his system.

Under respondent's invention, then, a general purpose computer is programmed to provide bank customers with an individualized and categorized breakdown of their transactions during the period in question.

[*223] II After reviewing respondent's patent application, the patent examiner rejected all the claims therein. He found that respondent's claims were invalid as being anticipated by the prior art, 35 U.S.C. § 102, and as not "particularly pointing out and distinctly claiming" what respondent was urging to be his invention. § 112.

Respondent appealed to the Patent and Trademark Office Board of Appeals. The Board rejected respondent's application on several grounds. It found first that under § 112, the application was indefinite and did not distinctly enough claim what respondent was urging to be his invention. It also concluded that respondent's claims were invalid under § 101 because they claimed nonstatutory subject matter. According to the Board, computer-related inventions which extend "beyond the field of technology... are nonstatutory," Pet. for Cert. 31A. See *Application of Foster*, 58 C.C.P.A. (Pat.) 1001, 1004, [*1396] 438 F. 2d 1011, 1015 (1971); *Application of Musgrave*, 57 C.C.P.A. (Pat.) 1352, 431 F. 2d 882 (1970), and respondent's claims were viewed to be "non-technological." Finally, respondent's claims were rejected on grounds of obviousness. 35 U.S.C. § 103. The Board found that respondent's claims were obvious variations of established uses of digital computers in banking and obvious variations of an invention, developed for use in business organizations, that had already been patented. Dirks, U.S. Patent No. 3,343,133.

The CCPA, in a 3-2 ruling, reversed the decision of the Board and held respondent's invention to be patentable. The court began by distinguishing its view of respondent's invention as a "record-keeping machine system for financial accounts" from the Board's rather negative view of the claims as going solely to the "relationship of [*224] a bank and its customers." 502 F. 2d, at 770 (emphasis in CCPA opinion). As such, the CCPA held, respondent's system was "clearly within the 'technological arts,'" *id.*, at 771, and was therefore statutory subject matter under 35 [*697] U.S.C. § 101. Moreover, the court held that respondent's claims were narrowly enough drawn and sufficiently detailed to pass muster under the definiteness requirements of § 112. Dealing with the final area of the Board's rejection, the CCPA found that neither established banking practice nor the Dirks patent rendered respondent's system "obvious to one of ordinary skill in the art who did not have [respondent's] specification before him." 502 F. 2d, at 772.

In order to hold respondent's invention to be patentable, the CCPA also found it necessary to distinguish this Court's decision in *Gottschalk v. Benson*, 409 U.S. 63 (1972), handed down some 13 months subsequent to the Board's ruling in the instant case. In *Benson*, the respondent sought to patent as a "new and

useful process, " 35 U.S.C. § 101, "a method of programming a general-purpose digital computer to convert signals from binary-coded decimal form into pure binary form." 409 U.S., at 65. As we observed: The claims were not limited to any particular art or technology, to any particular apparatus or machinery, or to any particular end use." *Id.*, at 64. Our limited holding, *id.*, at 71, was that respondent's method was not a patentable "process" as that term is defined in 35 U.S.C. § 100 (b).¹

1 "The term 'process' means process, art or method, and includes a new use of a known process, machine, manufacture, composition of matter, or material." 35 U.S.C. § 100 (b).

The Solicitor of the Patent Office argued before the CCPA that *Benson's* holding of nonpatentability as to the computer program in that case was controlling here. [*225] However, the CCPA concluded that while *Benson* involved a claim as to the patentability of a "process," respondent in this case was advancing claims as to the patentability of an "apparatus" or "machine" which did not involve discoveries so abstract as to be unpatentable: S"The issue considered by the Supreme Court in *Benson* was a narrow one, namely, is a formula for converting binary coded decimal numerals into pure binary numerals by a series of mathematical calculations a patentable process?" (Emphasis added.) [Quoting *In re Christensen*, 478 F. 2d 1392, 1394 (CCPA 1973).

"[T]he instant claims in *apparatus* form do not claim or encompass a law of nature, a mathematical formula, or an algorithm." 502 F. 2d, at 771 (emphasis in CCPA opinion).I Having disposed of the Board's rejections and having distinguished *Benson* to its satisfaction, the court held respondent's invention to be patentable. The Commissioner of Patents sought review in this Court and we granted certiorari. 421 U.S. 962 (1975). We hold that respondent's invention was obvious under 35 U.S.C. § 103 and therefore reverse.

III

As a judicial test, "invention" - i.e., "an exercise of the inventive faculty, [*1397] " *McClain v. Ortmyer*, 141 U.S. 419, 427 (1891) - has long been regarded as [*698] an absolute prerequisite to patentability. See, e.g., *Keystone Driller Co. v. Northwest Engineering Corp.*, 294 U.S. 42 (1935); *Sharp v. Stamping Co.*, 103 U.S. 250 (1880); *Hotchkiss v. Greenwood*, 11 How. 248

(1851). However, it was only in 1952 that Congress, in the interest of "uniformity and definiteness," articulated the requirement in a statute, [*226] framing it as a requirement of "nonobviousness." ² Section 103 of the Patent Act of 1952, 35 U.S.C. § 103, provides in full: S"A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made."I

2 S. Rep. No. 1979, 82d Cong., 2d Sess., 6 (1952); H.R. Rep. No. 1923, 82d Cong., 2d Sess., 7 (1952).

[**LEdHR2] [2][This Court treated the scope of § 103 in detail in *Graham v. John Deere Co.*, 383 U.S. 1 (1966). There, we held that § 103 "was not intended by Congress to change the general level of patentable invention," but was meant "merely as a codification of judicial precedents... with congressional directions that inquiries into the obviousness of the subject matter sought to be patented are a prerequisite to patentability." *Id.*, at 17. While recognizing the inevitability of difficulty in making the determination in some cases, we also set out in *Graham*, *supra*, the central factors relevant to any inquiry into obviousness: "the scope and content of the prior art," the "differences between the prior art and the claims at issue," and "the level of ordinary skill in the pertinent art." *Ibid.* Guided by these factors, we proceed to an inquiry into the obviousness of respondent's

[**LEdHR1B] [1B]system.

As noted, *supra*, at 223, the Patent and Trademark Office Board of Appeals relied on two elements in the prior art in reaching its conclusion that respondent's [*227] system was obvious. We find both to be highly significant. The first was the nature of the current use of data processing equipment and computer programs in the banking industry. As respondent's application itself observes, that use is extensive: S

"Automatic data processing equipments employing digital computers have been developed for the handling

of much of the record-keeping operations involved in a banking system. The checks and deposit slips are automatically processed by forming those items as machine-readable records.... With such machine systems, most of the extensive data handling required in a bank can be performed automatically." Pet. for Cert. 3A.1

It is through the use of such data processing equipment that periodic statements are ordinarily given to a bank customer on each of the several accounts that he may have at a [***699] given bank. Under respondent's system, what might previously have been separate accounts are treated as a single account, and the customer can see on a single statement the status and progress of each of his "subaccounts." Respondent's "category code" scheme, see *supra*, at 221, is, we think, closely analogous to a bank's offering its customers multiple accounts from which to choose for making a deposit or writing a check. Indeed, as noted by the Board, the addition of a category number, varying with the nature of the transaction, to the end of a bank customer's regular account number, creates "in effect, a series [**1398] of different and distinct account numbers...." Pet. for Cert. 34A. Moreover, we note that banks have long segregated debits attributable to service charges *within* any given separate account and have rendered their customers subtotals for those charges.

[***LEdHR3] [3]The utilization of automatic data processing equipment in the traditional separate account system is, of course, [**228] somewhat different from the system encompassed by respondent's invention. As the CCPA noted, respondent's invention does something other than "provide a customer with... a summary sheet consisting of net totals of plural separate accounts which a customer may have at a bank." 502 F. 2d, at 771. However, it must be remembered that the "obviousness" test of § 103 is not one which turns on whether an invention is equivalent to some element in the prior art but rather whether the difference between the prior art and the subject matter in question "is a difference sufficient to render the claimed subject matter unobvious to one skilled in the applicable art...." *Id.*, at 772 (Markey, C.J., dissenting).

[***LEdHR1C] [1C] There is no need to make the obviousness determination in this case turn solely on the nature of the current use of data processing and computer programming in the banking industry. For, as noted, the Board pointed to a second factor - a patent issued to

Gerhard Dirks - which also supports a conclusion of obviousness. The Dirks patent discloses a complex automatic data processing system using a programmed digital computer for use in a large business organization. Under the system transaction and balance files can be kept and updated for each department of the organization. The Dirks system allows a breakdown within each department of various areas, e.g., of different types of expenses. Moreover, the system is sufficiently flexible to provide additional breakdowns of "sub-areas" within the areas and can record and store specially designated information regarding each of any department's transactions. Thus, for instance, under the Dirks system the disbursing office of a corporation can continually be kept apprised of the precise level and nature of the corporation's disbursements within various areas or, as the Dirks patent terms them, "Item Groups."

[*229] Again, as was the case with the prior art within the banking industry the Dirks invention is not equivalent to respondent's system. However, the departments of the business organization and the areas or "Item Groups" under the Dirks system are closely analogous to the bank customers and category number designations respectively under respondent's system. And each [***700] shares a similar capacity to provide breakdowns within its "Item Groups" or category numbers. While the Dirks invention is not designed specifically for application to the banking industry many of its characteristics and capabilities are similar to those of respondent's system. Cf. *Graham*, 383 U.S., at 35.

[***LEdHR4] [4]In making the determination of "obviousness," it is important to remember that the criterion is measured not in terms of what would be obvious to a layman, but rather what would be obvious to one "reasonably skilled in [the applicable] art." *Id.*, at 37. In the context of the subject matter of the instant case, it can be assumed that such a hypothetical person would have been aware both of the nature of the extensive use of data processing systems in the banking industry and of the system encompassed in the Dirks patent. While computer technology is an exploding one, "[i]t is but an evenhanded application to require that those persons granted the benefit of a patent monopoly be charged with an awareness" of that technology. *Id.*, at 19.

[***LEdHR5] [5] [***LEdHR6A] [6A] Assuming such an awareness, respondent's system would, we think, have been obvious to one "reasonably skilled in [the

applicable] art." There may be differences between respondent's invention and [**1399] the state of the prior art. Respondent makes much of his system's ability to allow "a large number of small users to get the benefit of large-scale electronic computer equipment and still continue to use their individual ledger format and [*230] bookkeeping methods." Brief for Respondent 65. It may be that that ability is not possessed to the same extent either by existing machine systems in the banking industry or by the Dirks system.³ But the mere existence of differences between the prior art and an invention does not establish the invention's nonobviousness. The gap between the prior art and respondent's system is simply not so great as to render the system nonobvious to one reasonably skilled in the art.⁴

[***LEdHR6B] [6B]

3 The Dirks patent does allow "the departments or other organizational users [*i.e.*, the analogues to bank customers under respondent's invention, to] retain their authority over operative file systems" and indicates that "[p]rogramming is very easy and different programs are very easily coordinated."

4 While "commercial success without invention will not make patentability," *A&P Tea Co. v. Supermarket Corp.*, 340 U.S. 147, 153 (1950), we did indicate in *Graham v. John Deere Co.*, 383 U.S. 1 (1966), that "secondary considerations [such] as commercial success, long felt but unsolved needs, [and] failure of others" may be relevant in a determination of obviousness. *Id.*, at 17. Respondent does not contend nor can we conclude that any of these secondary considerations offer any substantial support for

his claims of nonobviousness.

Accordingly, we reverse the Court of Customs and Patent Appeals and remand this case to that court for further proceedings consistent with this opinion.

So ordered.

MR. JUSTICE BLACKMUN and MR. JUSTICE STEVENS took no part in the consideration or decision of this case.

REFERENCES

60 *Am Jur 2d*, *Patents* 53-86

19 *Am Jur Pl & Pr Forms* (Rev ed), *Patents*, Forms 1-6

14 *Am Jur Legal Forms 2d*, *Patents* 196:11 et seq.

35 *USCS 103*

US L Ed Digest, *Patents* 19.1

ALR Digests, *Patents* 7

L Ed Index to *Annos*, *Computers*; *Patents*

ALR Quick Index, *Computers*; *Patents*

Federal Quick Index, *Computers*; *Patents*

Annotation References:

Application and effect of 35 *USCS 103*, requiring nonobvious subject matter, in determining validity of patents. 23 ALR Fed 326.

Patentability of computer programs. 6 ALR Fed 156.

LEXSEE 910 F.2D 831

IN RE RAYMOND G. BOND

No. 90-1023

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

910 F.2d 831; 1990 U.S. App. LEXIS 13087; 15 U.S.P.Q.2D (BNA) 1566

August 3, 1990, Decided

SUBSEQUENT HISTORY: [**1] As Corrected
 August 10, 1990. Rehearing Denied November 1, 1990.
 Reported at: *1990 U.S. App. LEXIS 19971*.

PRIOR HISTORY: Appealed from U.S. Patent &
 Trademark Office Board of Patent Appeals &
 Interferences.

COUNSEL: Keith D. Beecher, Jessup, Beecher &
 Slehofer, of Santa Monica, California, argued for
 Appellant.

Muriel E. Crawford, Assistant Solicitor, Office of the
 Solicitor, of Arlington, Virginia, argued for Appellee.
 With her on the brief was Fred E. McKelvey, Solicitor.

JUDGES: Archer, Circuit Judge, Baldwin, Senior Circuit
 Judge, and Tashima, District Judge. *

* District Judge A. Wallace Tashima of the
 Central District of California, sitting by
 designation.

OPINION BY: PER CURIAM

OPINION

[*832] This appeal is from the decision of the
 United States Patent and Trademark Office Board of
 Patent Appeals and Interferences (Board), Appeal No.
 89-1286, dated June 30, 1989, affirming the examiner's
 final rejection of both claims of Raymond G. Bond's
 patent application Serial No. 840,007, filed March 17,
 1986, entitled "Remote Turn-on Control System for
 Telephone Answering Machine." We vacate-in-part,
 reverse-in-part and remand.

I

The application involves one of the [**2] remote
 control features of a telephone answering machine, the
 remote turn-on feature. The machine owner who forgot to
 set the machine to answer (e.g., it was set to play back
 messages) can call the machine and set it to answering
 mode remotely by ringing the phone a certain number of
 times. Once the machine is set, it will remain in this
 mode and answer calls until it is set to another mode. In
 this respect, the application involves technology
 essentially identical to the device patented by Curtis, et
 al., U.S. Patent No. 3,723,656 (Curtis).

Bond claims a combination of the above technology
 and a delay means which would prevent the machine
 from answering the owner's initial call for a
 predetermined period of time after it has set itself to
 answer (claim 1). Bond argues that the prior art does not
 leave sufficient time to hang up after setting the machine
 to answer, and the owner therefore may incur toll
 charges. Claim 1 was rejected under *35 U.S.C. § 102* over
 Curtis. Bond also claims the use of a microcomputer
 containing an internal counter to implement the control
 and delay structures (claim 2). Claim 2 was rejected
 under *35 U.S.C. § 103* [**3] over Curtis in view of
 Hanscom.¹

1 Hanscom was awarded U.S. Patent No.
 4,400,586 for a "Remote Message Repeat Control
 For Telephone Answering System." Hanscom's
 claimed invention includes a means for retrieving
 messages remotely using a "beeper" to alert the
 machine that it should perform that function. The
 Hanscom specification provides that the essential
 control functions are performed by a
 microcomputer.

II

The Board affirmed the examiner's rejection of claim 1. "For a prior art reference to anticipate in terms of 35 U.S.C. § 102, every element of the claimed invention must be identically shown in a single reference." *Diversitech Corp. v. Century Steps, Inc.*, 850 F.2d 675, 677, 7 USPQ2d 1315, 1317 (Fed. Cir. 1988). These elements must be arranged as in the claim under review, *Lindemann Maschinenfabrik v. American Hoist & Derrick Co.*, 730 F.2d 1452, 1458, 221 USPQ 481, 485 (Fed. Cir. 1984), [*4] but this is not an "ipsissimis verbis" test, *Akzo N.V. v. United States Int'l Trade Comm'n*, 808 F.2d 1471, 1479 & n. 11, 1 USPQ2d 1241, 1245 & n. 11 (Fed. Cir. [*833] 1986), cert. denied, 482 U.S. 909, 96 L. Ed. 2d 382, 107 S. Ct. 2490 (1987). "Anticipation is a fact question subject to review under the clearly erroneous standard." *In re King*, 801 F.2d 1324, 1326, 231 USPQ 136, 138 (Fed. Cir. 1986).

Claim 1 provides for a combination of control means, first circuit means, second circuit means, and

delay means included in said control means for delaying the seizure of said telephone line by said second circuit means for a predetermined time interval after said telephone answering machine has been set to said automatic answering mode so as to permit the calling party to get off the telephone line and avoid telephone charges.

"It is axiomatic that, in proceedings before the PTO, claims in an application are to be given their [*5] broadest reasonable interpretation consistent with the specification, [] and that claim language should be read in light of the specification as it would be interpreted by one of ordinary skill in the art." *In re Sneed*, 710 F.2d 1544, 1548, 218 USPQ 385, 388 (Fed. Cir. 1983) (citations omitted). The specification provides that this delay is implemented through digital means as follows:

When the telephone answering machine is so set to the automatic answer mode, an internal counter in the microcomputer Z107 delays the time until pin 31 goes high, so that actual line seizure is delayed. This permits the calling party to get off the

line before any toll charges are assessed.

Once pin 31 "goes high," the answering machine immediately seizes the line. By contrast, seizure of the line is delayed in the Curtis device through analog means. 2 A delay occurs between the time the machine sets to answer -- in response to, for example, the tenth ring signal -- and the seizure of the line -- which takes place only on receipt of the next ring signal. 3

2 The board found that "Curtis disclosed a delay means (R1-R5, C3-C4 and the fixed time between rings) which delays the seizure of the telephone line for a predetermined time after the machine has been set." It would seem from our review of the Curtis disclosure that resistors R1 - R5 and capacitors C3 and C4 do not function to produce any delay after the device is energized, i.e., set to the automatic answering mode. Rather, their role seems to be limited to producing the delay that precedes the energizing of the answering device. If our understanding of the Curtis disclosure is correct, the delay experienced by the Curtis device between the time the device is energized and the time it seizes the telephone line is a function solely of the fixed time between telephone rings, which delay is not produced by structure within the Curtis device. In view of our vacatur and remand of the board's decision regarding claim 1 on other grounds, we need not further consider the question of whether there is structure in Curtis to delay seizure of the line after the device is energized.

[**6]

3 The board found that in the Curtis device "the line is not seized immediately but only after one additional ring" (emphasis added); the Curtis specification discloses that the incoming call is answered by the answering machine "on" the next ring. See col. 4, lines 16-17.

The disclosed and prior art structures are not identical, but the claim may nonetheless be anticipated. While a "means-plus-function" limitation may appear to include all means capable of achieving the desired function, the statute requires that it be "construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof." 35 U.S.C. § 112 para. 6 (emphasis added); see *In re Iwahashi*, 888 F.2d 1370, 1375 n. 1, 12 USPQ2d 1908, 1912 n. 1 (Fed.

Cir. 1989) (applying § 112 para. 6 to PTO proceedings, and harmonizing prior case law); *Johnston v. Ivac Corp.*, 885 F.2d 1574, 1580, 12 USPQ2d 1382, 1386 (Fed. Cir. 1989) [**7] ("section 112 para. 6 operates to cut back on the types of means which could literally satisfy the claim language," (emphasis in original)). However, the Board made no finding that the delay means of claim 1 and that embodied in the Curtis device are structurally equivalent. Accordingly, its decision as to the anticipation of claim 1 is deficient and must be vacated. Since structural equivalency under section 112 para. 6 is a question of fact, see *Pennwalt Corp. v. Durand-Wayland*, 833 F.2d 931, 933-34, 4 USPQ2d 1737, 1739 (Fed. Cir. 1987) (*in banc*), the [*834] court will not reach that question in the first instance. ⁴

4 In light of this disposition, the court need not resolve the question of how closely synchronized are the ring signals heard by the calling and called parties.

III

The Board rejected claim 2, which depends from claim 1, on the ground that the use of a microcomputer to achieve the delay would have been obvious to one skilled in the art. "A [**8] determination that an invention would have been obvious under § 103 is a conclusion of law based on fact. [] The degree to which the determination involves facts, and is thus subject to the 'clearly erroneous' standard . . . is that degree required to erect a foundation of facts sufficient to support the legal conclusion." *Ryco, Inc. v. Ag-Bag Corp.*, 857 F.2d 1418, 1423, 8 USPQ2d 1323, 1327 (Fed. Cir. 1988) (citations omitted). See also *In re Caveney*, 761 F.2d 671, 674, 226 USPQ 1, 3 (Fed. Cir. 1985).

Claim 2 modifies claim 1 by defining the control and delay means thereof as "comprising a microcomputer having an internal counter to delay the seizure of said telephone line until the counter reaches a predetermined count." In its opinion, the Board stated:

Curtis discloses an analog circuit for counting calls [sic, rings]. . . . Hanscom discloses that it was conventional to count calls [rings] digitally in a telephone answering machine by means of a microcomputer. . . . We hold that the artisan, having the suggestions of Curtis and Hanscom before him at the time the

invention was [**9] made, would have found it manifestly obvious to combine these teachings to obtain the subject matter of claim 2.

We are convinced that this holding does not recognize that there are critical differences between the claimed invention and the prior art. See *Graham v. John Deere Co.*, 383 U.S. 1, 17-18, 148 USPQ 459, 467, 15 L. Ed. 2d 545, 86 S. Ct. 684 (1966) (the difference between the claimed invention and the prior art is one of the four factual inquiries pertinent to any obviousness inquiry under 35 U.S.C. § 103). It also does not reflect the admonition of this court that "obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the combination." *Carella v. Starlight Archery and Pro Line Co.*, 804 F.2d 135, 140, 231 USPQ 644, 647 (Fed. Cir. 1986); see also *ACS Hosp. Sys., Inc. v. Montefiore Hosp.*, 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984). The Board's analysis is a classical example [**10] of a hindsight reconstruction of the claimed invention.

Bond's claimed invention includes a microcomputer which functions to delay seizure of the telephone line once the device has been set to the automatic answering mode. The Board found that the Curtis device experiences some delay after it has been energized and before it seizes the telephone line. Such a delay is only inherent in the Curtis system and Curtis neither places any importance on this delay nor specifically notes that line seizure should be further deferred. Hanscom, the secondary reference, discloses a familiar telephone answering machine that employs a microcomputer which delays seizure of the telephone line until after a preset number of rings, while using a microcomputer to count the number of incoming rings. Hanscom is silent with respect to whether a device like that disclosed by Curtis should embody a delay following activation of the answering mode and before line seizure, or how such a delay should be implemented. For the purpose of its combination with Curtis, the Hanscom patent merely discloses that microcomputers can be used as a means for counting telephone rings entering an automatic answering machine.

[**11] When the claimed invention is contrasted

with the Curtis and Hanscom devices, a distinct difference becomes apparent -- the claimed invention embodies a microcomputer placed within the system which delays seizure of the telephone line for a predetermined period of time following activation of the device's answering mode. Unless the Curtis and Hanscom disclosures would [*835] have suggested to one of ordinary skill in the art at the time the invention was made that a microcomputer should be so employed, claim 2 is not unpatentable under 35 U.S.C. § 103 on this record. See *Uniroyal, Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 1050-51, 5 USPQ2d 1434, 1438 (Fed. Cir.) cert. denied, 488 U.S. 825, 109 S. Ct. 75, 102 L. Ed. 2d 51 (1988). On balance, we conclude, given the factual findings of the Board (including the finding that the Curtis device *does* contain some structure which is involved in producing the inherent delay in seizing the telephone line after activation of the automatic answering mode, see footnote 2, *supra*), that even though the Curtis device does experience some inherent delay, the cited references [**12] would not have suggested the claimed invention to one of ordinary skill. Neither reference expressly or implicitly suggests that a microcomputer assembly should be embodied in a Curtis-like device in

such a manner as would produce the inherent, yet unmentioned, delay experienced by the Curtis device.

IV

In conclusion, the Board's decision is (1) vacated insofar as it holds that the invention of claim 1 of Bond's application is anticipated by the Curtis device; (2) reversed insofar as it holds that claim 2 is unpatentable under 35 U.S.C. § 103 over Curtis in view of Hanscom; and (3) remanded. On remand, the Board should consider whether the delay experienced by the Curtis device after activation of the answering mode and before seizure of the telephone line is caused by any "structure" within the Curtis device and, if so, whether this "structure" is equivalent to that disclosed in Bond's specification as exemplary of the claim 1 delay means. Only if each of these inquiries is answered in the affirmative is the invention defined in claim 1 anticipated by the Curtis disclosure.

VACATED-IN-PART, REVERSED-IN-PART, and
REMANDED.

LEXSEE 527 F.2D 1226

IN THE MATTER OF THE APPLICATION OF WILLIAM P. CLINTON, JOE W.
JOHNSON, FRANKLYN W. MEYER, RICHARD A. PFLUGER, and GERALD E.
JACOBS

Patent Appeal No. 75-587

UNITED STATES COURT OF CUSTOMS AND PATENT APPEALS

527 F.2d 1226; 1976 CCPA LEXIS 201; 188 U.S.P.Q. (BNA) 365

January 15, 1976, DECIDED.

PRIOR HISTORY: [*1] Serial No. 830,195.

Freeze drying the granular frozen concentrated coffee extract is generally accomplished at a condenser temperature below -30 degrees F. and a pressure [*2] below 500 microns, until the granular frozen extract has a moisture content of between 1% and 2.5%.

OPINION BY: LANE**OPINION**

[*1226] LANE, Judge.

This is an appeal from the decision of the Patent and Trademark Office Board of Appeals affirming the examiner's rejection of claims 1, 3, and 5 through 9, all of the claims remaining in application serial No. 830,195, filed May 20, 1969, for an "Improved Process for Producing Aromatized Freeze-Dried Coffee." We affirm.

Background

The subject matter of the claims is a process of producing a stable, freeze-dried, soluble coffee. Roasted and [*1227] ground coffee is percolated to obtain a coffee extract containing from 20% to 35% soluble coffee solids. This initial coffee extract is freeze concentrated by partial freezing to form ice crystals and concentrated coffee extract. The concentrated coffee extract, containing 35% to 55% soluble coffee solids, is separated from the ice crystals and frozen, comminuted, and dried.

The concentrated coffee extract is first cooled below its eutectic point, and the frozen extract is ground to a granular particle size.

Claims 1 and 8 are representative:

1. A process for preparing a granular freeze-dried coffee having a dark color which comprises percolating roasted and ground coffee to obtain a coffee extract containing 20-35% soluble solids and desired flavor and aroma values, freeze-concentrating said extract to a solids level of 35-55% by partially freezing the water in said extract as ice crystals and removing said ice crystals from the concentrated extract, cooling said concentrated extract to below its eutectic point, grinding the frozen extract to a granular particle size, and then freeze-drying said granular frozen extract to between 1 and 2.5% moisture under vacuum conditions of less than 500 microns while maintaining the product temperature of said coffee below 120 degrees F.

8. The process of claim 1 wherein the coffee extract is chilled to between 33 degrees and 45 degrees F. and held for a period sufficient to cause insoluble sediment to form in the extract and then separating said sediment from the extract prior to freeze-concentration.

The patents relied upon by the board [*3] are:

Colton	2,751,687 June 26, 1956
Ganiaris	3,283,522 November 8, 1966 (filed Nov. 4, 1963)
Cottle et al.	3,362,178 January 9, 1968 (filed Jan. 3, 1964)
Clinton et al.	3,428,784 April 15, 1969

The board also relied on M. Sivetz, *Coffee Processing Technology*, 14-25 (1963).

Flosdorf discloses a process of freeze drying fruit juices and extracts such as coffee extract. The solution to be freeze dried is pre-concentrated, e.g., by subjecting the material to partial freezing with the formation of a slurry of ice crystals and concentrate, and separating the concentrate from the ice crystals. The pre-concentrated product is then frozen and, after freezing, subjected to a high vacuum to remove the water present and dry the product. The dried product may be granulated. If the process is carried out as a continuous process (rather than a batch process), the concentrate may be frozen and granulated prior to freeze drying.

Colton discloses a process of preserving materials such as food extracts and beverages by freezing the material, granulating the frozen material, and freeze drying the frozen granules.

Ganiaris discloses [**4] a process for freeze concentrating an aqueous solution such as coffee. The aqueous solution is chilled to form a slurry of ice crystals and concentrated aqueous solution. The concentrated solution is separated from the ice crystals.

Cottle et al. disclose a process of removing sediment formed on cooling an aqueous solution. Upon cooling, an aqueous solution may form a sediment at a temperature slightly above the temperature at which ice crystals begin to form. This is disclosed to be a problem in processes of concentration by crystallization, e.g., concentrating food products and beverages by crystallization. This sediment may be removed and the solution further cooled to form a slurry of [*1228] ice crystals and concentrated aqueous solution. The ice crystals are separated from the concentrated aqueous solution.

Clinton et al. disclose a process of freeze drying a coffee extract. The coffee extract is slowly frozen from its ice point to below its eutectic point over a period of at

least 15 minutes to develop a non-ordered distribution of dendritic ice crystals. The dendritic ice crystals are characterized by non parallel main stems, smaller extending branches from [**5] said main stems, and an absence of ice crystals of non-dendritic form in the eutectic mixture located between the dendritic ice crystals. The frozen coffee extract is comminuted to obtain a granular product. This frozen granular product is vacuum freeze-dried.

The portion of the Sivetz treatise on coffee processing technology relied upon discloses that freeze concentration can produce a concentrated extract containing 50% soluble coffee solids. Although Sivetz states that (at the time of his publication) freeze concentration of coffee solids was not practiced commercially, this statement is qualified by the statement that both theoretical and practical considerations favor freeze concentration.

The examiner rejected all of the claims under 35 USC 103, either in view of the disclosure of Flosdorf considered together with Colton and Sivetz, or in view of the disclosure of Clinton et al. considered together with Ganiaris. The examiner also relied upon the disclosure of Cottle et al. in connection with the cooling and clarification steps of claims 8 and 9. The board affirmed each rejection.

OPINION

Appellants admit that the individual steps of freeze concentrating and freeze [**6] drying a coffee extract are disclosed in the prior art, but contend that there is no suggestion in the prior art to combine these individual steps. With respect to the additional steps of cooling and clarification in claims 8 and 9, appellants admit that these steps are also generally disclosed in the prior art, but contend that it would not have been obvious to apply these procedures to remove sediment from coffee extract prior to freeze concentration. Appellants also contend that when all the prior art is considered together, one of ordinary skill in the art would not have a sufficient basis

for the necessary predictability of success to sustain a rejection under 35 USC 103. *In re Mercier*, 515 F.2d 1161, 1167, 185 USPQ 774, 779 (CCPA 1975).

We have carefully reviewed the record and are persuaded that a person of ordinary skill in the art would have had sufficient motivation to combine the individual steps forming the claimed process. *In re Adams*, 53 CCPA 996, 1000, 356 F.2d 998, 1001-02, 148 USPQ 742, 745 (1966); *In re Bergel*, 48 CCPA 1102, 1105, 292 F.2d 955, 956-57, 130 USPQ 206, 208 (1961).

We first consider the references by themselves to see whether they suggest doing [*7] what appellants have done. *In re Skoll*, 523 F.2d 1392, 187 USPQ 481 (CCPA 1975). Flosdorf alone suggests subjecting a coffee extract to a combination of freeze concentration and freeze drying. Cottle et al. disclose that freeze concentration of food products and beverages generally may result in the formation of a sediment which can be removed by cooling and clarification. Although Cottle et al. do not disclose sediment formation in coffee extract in particular, we think it would have been within the ability of a worker of ordinary skill in the art aware of Cottle et al. to subject a coffee extract to gradual cooling and to remove any resultant sediment prior to freeze concentration.

We next consider whether a person of ordinary skill in the art combining the individual steps which form the claimed process would have a sufficient basis for the required expectation of success. Obviousness does not require absolute predictability, but a reasonable expectation of success is necessary. *In re Mercier*, *supra*; *In re Naylor*, 54 CCPA 902, 369 F.2d 765, 152 USPQ 106 (1966); *In re Pantzer*, 52 CCPA 1135, 341 F.2d 121, 144 USPQ 415 (1965). Flosdorf states that the freeze-dried coffee [*1229] [*8] obtained by the disclosed process has excellent properties. Appellant argues that Sivetz discloses that some flavor is lost in freeze concentrating a coffee extract. Nothing in the Sivetz reference detracts from the clear statements in Flosdorf. Cottle et al. are concerned with preserving the original freshness and flavor of food products and beverages. We think a person of ordinary skill in the art would reasonably expect that the combination of steps suggested by the references would produce a freeze-dried coffee having desirable properties. We conclude that these references make a prima facie case of obviousness which appellants have failed to rebut.

Appellants also contend that the Board of Appeals has ignored certain claim limitations requiring freeze drying the coffee extract to a final moisture content between 1% and 2.5%. Appellants point to certain statements in the disclosure of their application which they allege establish that the claimed moisture content is critical. Appellants' specification states:

It is necessary to dry the coffee extract to a stable moisture level of between 1 and 2.5%. Above this moisture range, it has been found that the soluble coffee [*9] product cakes and develops off-flavors upon storage. However, care should be taken not to dry the extract to a level of below 1% moisture since over-drying will cause an excess removal of aromatic materials including those which are essential to a good coffee flavor.

Absent any evidence to the contrary, we accept these statements as proof that the claimed final moisture content is critical. *Pines v. McAllister*, 38 CCPA 981, 988, 188 F.2d 388, 392, 89 USPQ 312, 315 (1951). Nevertheless we believe that a person of ordinary skill in the art would find the claimed final moisture content obvious in view of the cited references. The only detailed disclosure in Flosdorf describes freeze concentrating and freeze drying orange juice to a final moisture content of about 0.3%. In our opinion, one skilled in this art would start with 0.3% as a possible final moisture content for freeze-dried coffee. Recognizing the flavor deficiencies, the skilled artisan would tend to depart from 0.3%. The references all state that freeze drying is an expensive method of removing water. Economics alone would motivate a person of ordinary skill in the art producing a freeze-dried coffee by the Flosdorf [*10] process to find the highest final moisture content consistent with the excellent properties Flosdorf describes. A person of ordinary skill in the art, having no reason to expect that the optimum final moisture content of freeze-dried coffee is the same as freeze-dried orange juice, and being motivated to permit a higher final moisture content if possible, would soon find the claimed final moisture content.

Conclusion

The decision of the board is affirmed.

AFFIRMED

LEXSEE 175 F.3D 994

IN RE ANITA DEMBICZAK and BENSON ZINBARG, Appellants.

98-1498

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

175 F.3d 994; 1999 U.S. App. LEXIS 8109; 50 U.S.P.Q.2D (BNA) 1614

April 28, 1999, Decided

PRIOR HISTORY: [*1] Appealed from: Patent and Trademark Office Board of Patent Appeals and Interferences. (Serial No. 08/427,732).

DISPOSITION: REVERSED.

COUNSEL: David P. Gordon, of Stamford, Connecticut, argued for appellant. Of counsel was Thomas A. Gallagher, of Stamford, Connecticut.

John M. Whealan, Associate Solicitor, Office of the Solicitor, of Arlington, Virginia, argued for appellee. With him on the brief were Albin F. Drost, Acting Solicitor, and David R. Nicholson, Associate Solicitor.

JUDGES: Before MAYER, Chief Judge, MICHEL and CLEVINGER, Circuit Judges.

OPINION BY: CLEVINGER

OPINION

[*996] CLEVINGER, *Circuit Judge*.

Anita Dembiczak and Benson Zinbarg appeal the rejection, upheld by the Board of Patent Appeals and Interferences, of all pending claims in their Application No. 08/427,732. *See Ex Parte Dembiczak*, No. 96-2648, slip op. at 43 (May 14, 1998). Because the Board erred in sustaining rejections of the pending claims as obvious under 35 U.S.C. § 103(a) (*Supp. 1998*), and for obviousness-type double patenting, we reverse.

I

The invention at issue in this case is, generally

speaking, a large trash bag made of orange plastic and decorated with lines and facial features, allowing the bag, when filled [*2] with trash or leaves, to resemble a Halloween-style pumpkin, or jack-o'-lantern. As the inventors, Anita Dembiczak and Benson Zinbarg (collectively, "Dembiczak") note, the invention solves the long-standing problem of unsightly trash bags placed on the curbs of America, and, by fortuitous happenstance, allows users to express their whimsical or festive nature while properly storing garbage, leaves, or other household debris awaiting collection. Embodiments of the invention—sold under a variety of names, including Giant Stuff-A-Pumpkin TM, Funkins, Jack Sak TM, and Bag-O-Fun TM—have undisputedly been well-received by consumers, who bought more than seven million units in 1990 alone. Indeed, in 1990, the popularity of the pumpkin bags engendered a rash of thefts around Houston, Texas, leading some owners to resort to preventative measures, such as greasing the bags with petroleum jelly and tying them to trees. *See* R. Piller, "Halloween Hopes Die on the Vine," *Hous. Chron.*, Oct. 19, 1990, at 13A.

The road to profits has proved much easier than the path to patentability, however. In July 1989, Dembiczak filed a utility patent application generally directed to the pumpkin bags. [*3] In a February 1992 appeal, the Board of Patent Appeals and Interferences ("the Board") reversed the Examiner's rejection, but entered new grounds for rejection. Dembiczak elected to continue prosecution, filing a continuation application to address the new grounds for rejection. Thereafter, the invention made a second appearance before the Board, in April 1993, when the Board both sustained the Examiner's rejection and again entered new grounds for rejection. Again, a continuation application was filed (the instant

application). And again the Examiner's rejection was appealed to the Board, which sustained the rejection in a May 14, 1998, decision. *See Dembiczak*, slip op. at 43.

A

The patent application at issue includes claims directed to various embodiments of [*997] the pumpkin bag. Claims 37, 49, 51, 52, 58 through 64, 66 through 69, and 72 through 81 are at issue in this appeal. Though the claims vary, independent claim 74 is perhaps most representative:

74. A decorative bag for use by a user with trash filling material, the bag simulating the general outer appearance of an outer surface of a pumpkin having facial indicia thereon, comprising:

a flexible waterproof plastic [**4] trash or leaf bag having

an outer surface which is premanufactured orange in color for the user to simulate the general appearance of the outer skin of a pumpkin, and having

facial indicia including at least two of an eye, a nose and a mouth on the orange color outer surface for forming a face pattern on said orange color outer surface to simulate the general outer appearance of a decorative pumpkin with a face thereon,

said trash or leaf bag having first and second opposite ends, at least said second end having an opening extending substantially across the full width of said trash or leaf bag for receiving the trash filling material,

wherein when said trash or leaf bag is filled with trash filling material and closed, said trash or leaf bag takes the form and general appearance of a pumpkin with a face thereon.

All of the independent claims on appeal, namely 37, 52, 72, and 74, contain limitations that the bag must be "premanufactured orange in color," have "facial indicia,"

have openings suitable for filling with trash material, and that when filled, the bag must have a generally rounded appearance, like a pumpkin. Independent claims 37, 52, and 72 add the [**5] limitation that the bag's height must at least 36 inches. Claim 72 requires that the bag be made of a "weatherproof material," and claim 74, as shown above, requires that the bag be "waterproof." Claim 52 recites a "method of assembling" a bag with the general characteristics of apparatus claim 37.

B

The prior art cited by the Board includes:

(1) pages 24-25 of a book entitled "A Handbook for Teachers of Elementary Art," by Holiday Art Activities ("Holiday"), describing how to teach children to make a "Crepe Paper Jack-O-Lantern" out of a strip of orange crepe paper, construction paper cut-outs in the shape of facial features, and "wadded newspapers" as filling;

(2) page 73 of a book entitled "The Everything Book for Teachers of Young Children," by Martha Shapiro and Valerie Indenbaum ("Shapiro"), describing a method of making a "paper bag pumpkin" by stuffing a bag with newspapers, painting it orange, and then painting on facial features with black paint;

(3) *U.S. Patent No. 3,349,991* to Leonard Kessler, entitled "Flexible Container" ("Kessler"), describing a bag apparatus wherein the bag closure is accomplished by the use of folds or gussets in the bag material;

(4) [**6] *U.S. Patent No. Des. 310,023*, issued August 21, 1990 to Dembiczak ("Dembiczak '023"), a design patent depicting a bag with a jack-o'-lantern face;

(5) *U.S. Patent No. Des. 317,254*, issued June 4, 1991 to Dembiczak ("Dembiczak '254"), a design patent depicting a bag with a jack-o'-lantern face; and,

(6) Prior art "conventional" plastic lawn or trash bags ("the conventional trash bags").

Using this art, the Board affirmed the Examiner's final rejection of all the independent claims (37, 52, 72, 74) under 35 U.S.C. § 103, [*998] holding that they would have been obvious in light of the conventional trash bags in view of the Holiday and Shapiro references. The Board determined that, in its view of the prior art, "the only difference between the invention presently defined in the independent claims on appeal and the orange plastic trash bags of the prior art and the use of such bags resides in the application of the facial indicia to the outer surface of the bag." *Dembiczak*, slip op. at 18. The Board further held that the missing facial indicia elements were provided by the Holiday and Shapiro references' description of painting jack-o'-lantern faces on paper bags. See [*7] *id.* at 18-19. Dependent claims 49 and 79, which include a "gussets" limitation, were considered obvious under similar reasoning, except that the references cited against them included Kessler. See *id.* at 7.

The Board also affirmed the Examiner's obviousness-type double patenting rejection of all the independent claims in light of the two Dembiczak design patents ('023 and '254) and Holiday. See *id.* at 12. The Board held that the design patents depict a generally rounded bag with jack-o'-lantern facial indicia, and that the Holiday reference supplies the missing limitations, such as the "thin, flexible material" of manufacture, the orange color, the initially-open upper end, and the trash filling material. The Board also stated that the various limitations of the dependent claims—e.g., color, the inclusion of leaves as stuffing, and the dimensions—would all be obvious variations of the depictions in the Dembiczak design patents. See *id.* at 8-9. In addition, using a two-way test for obviousness-type double patenting, the Board held that the claims of the Dembiczak design patents "do not exclude" the additional structural limitations of the pending utility claims, [*8] and thus the design patents were merely obvious variations of the subject matter disclosed in the utility claims. See *id.* at 11. The Board further upheld, on similar grounds and with the inclusion of the Kessler reference, the obviousness-type double patenting rejection of dependent claim 49. See *id.* at 12.

This appeal followed, vesting this court with

jurisdiction pursuant to 28 U.S.C. § 1295(a)(4)(A) (1994).

II

A claimed invention is unpatentable if the differences between it and the prior art "are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art." 35 U.S.C. § 103(a) (*Supp.* 1998); see *Graham v. John Deere Co.*, 383 U.S. 1, 14, 148 U.S.P.Q. (BNA) 459, 465, 15 L. Ed. 2d 545, 86 S. Ct. 684 (1966). The ultimate determination of whether an invention is or is not obvious is a legal conclusion based on underlying factual inquiries including: (1) the scope and content of the prior art; (2) the level of ordinary skill in the prior art; (3) the differences between the claimed invention and the prior art; and (4) objective evidence of nonobviousness. See *Graham*, 383 U.S. at 17-18, 148 U.S.P.Q. (BNA) [*9] at 467; *Miles Labs, Inc., Inc. v. Shandon Inc.*, 997 F.2d 870, 877, 27 U.S.P.Q.2D (BNA) 1123, 1128 (*Fed. Cir.* 1993). We therefore review the ultimate determination of obviousness without deference to the Board, while examining any factual findings for clear error. See, e.g., *In re Zurko*, 142 F.3d 1447, 1459, 46 U.S.P.Q.2D (BNA) 1691, 1700 (*Fed. Cir.*) (en banc), cert. granted, 119 S. Ct. 401 (1998).

A

Our analysis begins in the text of *section 103* quoted above, with the phrase "at the time the invention was made." For it is this phrase that guards against entry into the "tempting but forbidden zone of hindsight," see *Loctite Corp. v. Ultraseal Ltd.*, 781 F.2d 861, 873, 228 U.S.P.Q. (BNA) 90, 98 (*Fed. Cir.* 1985), overruled on other grounds by *Nobelpharma AB v. Implant Innovations, Inc.*, 141 F.3d 1059, 46 U.S.P.Q.2D (BNA) 1097 [*999] (*Fed. Cir.* 1998), when analyzing the patentability of claims pursuant to that section. Measuring a claimed invention against the standard established by *section 103* requires the oft-difficult but critical step of casting the mind back to the time of invention, to consider the thinking of one of ordinary skill in the art, guided only by the prior art references and the then-accepted [*10] wisdom in the field. See, e.g., *W.L. Gore & Assoc., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1553, 220 U.S.P.Q. (BNA) 303, 313 (*Fed. Cir.* 1983). Close adherence to this methodology is especially important in the case of less technologically complex inventions, where the very ease with which the invention can be understood may prompt one "to fall victim to the

insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher." *Id.*

Our case law makes clear that the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis is rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references. *See, e.g., C.R. Bard, Inc. v. M3 Sys., Inc.*, 157 F.3d 1340, 1352, 48 U.S.P.Q.2D (BNA) 1225, 1232 (*Fed. Cir.* 1998) (describing "teaching or suggestion or motivation [to combine]" as an "essential evidentiary component of an obviousness holding"); *In re Rouffet*, 149 F.3d 1350, 1359, 47 U.S.P.Q.2D (BNA) 1453, 1459 (*Fed. Cir.* 1998) ("the Board must identify specifically . . . the reasons one of ordinary skill in the art would have been motivated to select [*11] the references and combine them"); *In re Frisch*, 972 F.2d 1260, 1265, 23 U.S.P.Q.2D (BNA) 1780, 1783 (*Fed. Cir.* 1992) (examiner can satisfy burden of obviousness in light of combination "only by showing some objective teaching [leading to the combination]"); *In re Fine*, 837 F.2d 1071, 1075, 5 U.S.P.Q.2D (BNA) 1596, 1600 (*Fed. Cir.* 1988) (evidence of teaching or suggestion "essential" to avoid hindsight); *Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*, 776 F.2d 281, 297, 227 U.S.P.Q. (BNA) 657, 667 (*Fed. Cir.* 1985) (district court's conclusion of obviousness was error when it "did not elucidate any factual teachings, suggestions or incentives from this prior art that showed the propriety of combination"). *See also Graham*, 383 U.S. at 18, 148 U.S.P.Q. (BNA) at 467 ("strict observance" of factual predicates to obviousness conclusion required). Combining prior art references without evidence of such a suggestion, teaching, or motivation simply takes the inventor's disclosure as a blueprint for piecing together the prior art to defeat patentability--the essence of hindsight. *See, e.g., Interconnect Planning Corp. v. Feil*, 774 F.2d 1132, 1138, 227 U.S.P.Q. (BNA) 543, 547 (*Fed. Cir.* 1985) ("The invention [*12] must be viewed not with the blueprint drawn by the inventor, but in the state of the art that existed at the time."). In this case, the Board fell into the hindsight trap.

We have noted that evidence of a suggestion, teaching, or motivation to combine may flow from the prior art references themselves, the knowledge of one of ordinary skill in the art, or, in some cases, from the nature of the problem to be solved, *see Pro-Mold & Tool Co. v. Great Lakes Plastics, Inc.*, 75 F.3d 1568, 1573, 37

U.S.P.Q.2D (BNA) 1626, 1630 (Fed. Cir. 1996), Para-Ordnance Mfg. v. SGS Imports Intern., Inc., 73 F.3d 1085, 1088, 37 U.S.P.Q.2D (BNA) 1237, 1240 (*Fed. Cir.* 1995), although "the suggestion more often comes from the teachings of the pertinent references," *Rouffet*, 149 F.3d at 1355, 47 U.S.P.Q.2D (BNA) at 1456. The range of sources available, however, does not diminish the requirement for actual evidence. That is, the showing must be clear and particular. *See, e.g., C.R. Bard*, 157 F.3d 1340 at 1352, 48 U.S.P.Q.2D (BNA) at 1232. Broad conclusory statements regarding the teaching of multiple references, standing alone, are not "evidence." *E.g., McElmurry v. Arkansas Power & Light Co.*, 995 F.2d 1576, 1578, 27 U.S.P.Q.2D (BNA) [*13] 1129, 1131 (*Fed. Cir.* 1993) ("Mere denials and conclusory statements, however, are not sufficient to establish a genuine issue of [*1000] material fact."); *In re Sichert*, 566 F.2d 1154, 1164, 196 U.S.P.Q. (BNA) 209, 217 (*CCPA* 1977) ("The examiner's conclusory statement that the specification does not teach the best mode of using the invention is unaccompanied by evidence or reasoning and is entirely inadequate to support the rejection."). In addition to demonstrating the propriety of an obviousness analysis, particular factual findings regarding the suggestion, teaching, or motivation to combine serve a number of important purposes, including: (1) clear explication of the position adopted by the Examiner and the Board; (2) identification of the factual disputes, if any, between the applicant and the Board; and (3) facilitation of review on appeal. Here, however, the Board did not make particular findings regarding the locus of the suggestion, teaching, or motivation to combine the prior art references.

All the obviousness rejections affirmed by the Board resulted from a combination of prior art references, *e.g.*, the conventional trash or yard bags, and the Holiday and Shapiro publications teaching [*14] the construction of decorated paper bags. *See Dembiczak*, slip op. at 6-7. To justify this combination, the Board simply stated that "the Holiday and Shapiro references would have suggested the application of . . . facial indicia to the prior art plastic trash bags." *Id.* at 18-19. However, rather than pointing to specific information in Holiday or Shapiro that suggest the combination with the conventional bags, the Board instead described in detail the similarities between the Holiday and Shapiro references and the claimed invention, noting that one reference or the other--in combination with each other and the conventional trash bags--described all of the limitations of the pending

claims. *See id.* at 18-28. Nowhere does the Board particularly identify any suggestion, teaching, or motivation to combine the children's art references (Holiday and Shapiro) with the conventional trash or lawn bag references, nor does the Board make specific--or even inferential--findings concerning the identification of the relevant art, the level of ordinary skill in the art, the nature of the problem to be solved, or any other factual findings that might serve to support a proper obviousness [*15] analysis. *See, e.g., Pro-Mold & Tool*, 75 F.3d at 1573, 37 U.S.P.Q.2D (BNA) at 1630.

To the contrary, the obviousness analysis in the Board's decision is limited to a discussion of the ways that the multiple prior art references can be combined to read on the claimed invention. For example, the Board finds that the Holiday bag reference depicts a "premanufactured orange" bag material, *see Dembiczak*, slip op. at 21, finds that Shapiro teaches the use of paper bags in various sizes, including "large", *see id.* at 22-23, and concludes that the substitution of orange plastic for the crepe paper of Holiday and the paper bags of Shapiro would be an obvious design choice, *see id.* at 24. Yet this reference-by-reference, limitation-by-limitation analysis fails to demonstrate how the Holiday and Shapiro references teach or suggest their combination with the conventional trash or lawn bags to yield the claimed invention. *See Rouffet*, 149 F.3d at 1357, 47 U.S.P.Q.2D (BNA) at 1459 (noting Board's failure to explain, when analyzing the prior art, "what specific understanding or technical principle . . . would have suggested the combination"). Because we do not discern any finding by [*16] the Board that there was a suggestion, teaching, or motivation to combine the prior art references cited against the pending claims, the Board's conclusion of obviousness, as a matter of law, cannot stand. *See C.R. Bard*, 157 F.3d at 1352, 48 U.S.P.Q.2D (BNA) at 1232; *Rouffet*, 149 F.3d at 1359, 47 U.S.P.Q.2D (BNA) at 1459; *Fritch*, 972 F.2d at 1265, 23 U.S.P.Q.2D (BNA) at 1783; *Fine*, 837 F.2d at 1075, 5 U.S.P.Q.2D (BNA) at 1600; *Ashland Oil*, 776 F.2d at 297, 227 U.S.P.Q. (BNA) at 667.

B

The Commissioner of Patents and Trademarks ("Commissioner") attempts to justify the Board's decision on grounds [*1001] different from that relied upon by the Board, arguing that one of ordinary skill in the art would have been motivated to combine the references. Of

course, in order to do so, the Commissioner must do what the Board did not do below: make specific findings of fact regarding the level of skill in the art ("a designer and manufacturer of trash and leaf bags, particularly one specializing in the ornamental and graphic design of such bags"), *Resp't Br.* at 14, the relationship between the fields of conventional trash bags and children's crafts, respectively ("the artisan would also have been well aware of the ancillary, [*17] corollary, and atypical uses of 'trash' bags such as their application in hobby and art projects"), *Resp't Br.* at 15, and the particular features of the prior art references that would motivate one of ordinary skill in a particular art to select elements disclosed in references from a wholly different field ("a designer and manufacturer of trash and leaf bags would have recognized the paper bag in Shapiro to be a trash bag and therefore would have been motivated to combine it with the admitted prior art plastic trash and leaf bags to arrive at the claimed invention"), *Resp't Br.* at 15. The Commissioner also appears to cite additional references in support of his obviousness analysis, noting that at least two design patents (in the record but not cited against the presently pending claims) teach the placement of "graphical information, including text, designs, and even facial indicia, to colored bags." *Resp't Br.* at 16. This new analysis, apparently cut from whole cloth in view of appeal, does little more than highlight the shortcomings of the decision below, and we decline to consider it. *See, e.g., In re Robertson*, 1999 U.S. App. LEXIS 3224, 169 F.3d 743, 746, [*18] 49 U.S.P.Q.2D (BNA) 1949, 1951 (Fed. Cir. 1999) ("We decline to consider [the Commissioner's] newly-minted theory as an alternative ground for upholding the agency's decision."); *In re Soni*, 54 F.3d 746, 751, 34 U.S.P.Q.2D (BNA) 1684, 1688 (Fed. Cir. 1995); *In re Hounsfield*, 699 F.2d 1320, 1324, 216 U.S.P.Q. (BNA) 1045, 1049 (Fed. Cir. 1983) (rejecting an "attempt[] by the Commissioner 'to apply a new rationale to support the rejection.'"); *see also* 35 U.S.C. § 144 (1994) (an appeal to the Federal Circuit "is taken on the record before The Patent and Trademark Office"). Because the Board has not established a *prima facie* case of obviousness, *see In re Bell*, 991 F.2d 781, 783, 26 U.S.P.Q.2D (BNA) 1529, 1531 (Fed. Cir. 1993) ("The PTO bears the burden of establishing a case of *prima facie* obviousness."), we therefore reverse the obviousness rejections, and have no need to address the parties' arguments with respect to secondary factors.

III

Dembiczak also asks this court to reverse the Board's rejection of the pending claims for obviousness-type double patenting, which is a judicially-created doctrine that seeks to prevent the applicant from expanding the grant of the patent right beyond the [*19] limits prescribed in Title 35. See, e.g., *In re Braat*, 937 F.2d 589, 592, 19 U.S.P.Q.2D (BNA) 1289, 1291-92 (Fed. Cir. 1991); *In re Longi*, 759 F.2d 887, 892, 225 U.S.P.Q. (BNA) 645, 648 (Fed. Cir. 1985). See also 35 U.S.C. § 154(a)(2) (Supp. 1998) (discussing patent term). The doctrine prohibits claims in a second patent which define "merely an obvious variation" of an invention claimed by the same inventor in an earlier patent. *Braat*, 937 F.2d at 592, 19 U.S.P.Q.2D (BNA) at 1292 (quoting *In re Vogel*, 57 C.C.P.A. 920, 422 F.2d 438, 441, 164 U.S.P.Q. (BNA) 619, 622 (CCPA 1970)). Thus, unless a claim sought in the later patent is patentably distinct from the claims in an earlier patent, the claim must be rejected. See *In re Goodman*, 11 F.3d 1046, 1052, 29 U.S.P.Q.2D (BNA) 2010, 2015 (Fed. Cir. 1993); *Vogel*, 422 F.2d at 441, 164 U.S.P.Q. (BNA) at 622. This question is one of law, which we review *de novo*. See *Goodman*, 11 F.3d at 1052, 29 U.S.P.Q.2D (BNA) at 2015; *Texas Instruments Inc. v. United States Int'l Trade Comm'n*, 988 F.2d 1165, 1179, 26 U.S.P.Q.2D (BNA) 1018, 1029 (Fed. Cir. 1993).

[*1002] A

The law provides that, in some very rare cases, obvious-type double patenting may be found between design and utility patents. [*20] See *Carman Indus., Inc. v. Wahl*, 724 F.2d 932, 939-40, 220 U.S.P.Q. (BNA) 481, 487 (Fed. Cir. 1983) (noting that, while theoretically possible, "double patenting is rare in the context of utility versus design patents"); *In re Thorington*, 57 C.C.P.A. 759, 418 F.2d 528, 536-37, 163 U.S.P.Q. (BNA) 644, 650 (CCPA 1969) (Double patenting between a design and utility patent is possible "if the features producing the novel aesthetic effect of a design patent or application are the same as those recited in the claims of a utility patent or application as producing a novel structure."); *In re Phelan*, 40 C.C.P.A. 1023, 205 F.2d 183, 98 U.S.P.Q. (BNA) 156 (CCPA 1953); *In re Barber*, 23 C.C.P.A. 834, 81 F.2d 231, 28 U.S.P.Q. (BNA) 187 (CCPA 1936); *In re Hargraves*, 19 C.C.P.A. 784, 53 F.2d 900, 11 U.S.P.Q. (BNA) 240 (CCPA 1931). In these cases, a "two-way" test is applicable. See *Carman*, 724 F.2d at 940, 220 U.S.P.Q. (BNA) at 487. Under this test, the obviousness-type double patenting rejection is appropriate only if the claims of the two patents cross-read, meaning that "the

test is whether the subject matter of the claims of the patent sought to be invalidated would have been obvious from the subject matter of the claims of the [*21] other patent, and vice versa." *Id.*, 220 U.S.P.Q. (BNA) at 487. See also *Braat*, 937 F.2d at 593, 19 U.S.P.Q.2D (BNA) at 1292 (explaining two-way test).

B

In making its double patenting rejection, the Board concluded that all but one of the pending claims of Dembiczak's utility application would have been merely an obvious variation of the claims of the earlier-issued design patents--the Dembiczak '023 and '254 references--in light of the Holiday reference. The remaining claim, dependent claim 49, was judged obvious in light of the combination of the Dembiczak design patents, Holiday, and the Kessler reference.

Acknowledging that the two-way test was required by *Carman*, 724 F.2d at 940, 220 U.S.P.Q. (BNA) at 487, the Board concluded that "the design claimed in each of appellants' design patents does not exclude the features pertaining to the construction and color of the bag, the use of a plastic material for making the bag, the size or thickness of the bag . . . or the use of various types of filling material The particular details of the facial indicia would have been a matter of design choice as evidenced by the Holiday handbook," and that therefore, in view of Holiday, the claims of the [*22] design patents were obvious variants of the pending utility patent claims. See *Dembiczak*, slip op. at 11. We disagree. In order for a design to be unpatentable because of obviousness, there must first be a basic design reference in the prior art, the design characteristics of which are "basically the same as the claimed design." *In re Borden*, 90 F.3d 1570, 1574, 39 U.S.P.Q.2D (BNA) 1524, 1526 (Fed. Cir. 1996); *In re Rosen*, 673 F.2d 388, 391, 213 U.S.P.Q. (BNA) 347, 350 (CCPA 1982). The phrase "having facial indicia thereon" found in the claims of the pending utility application is not a design reference that is "basically the same as the claimed design." *Borden*, 90 F.3d at 1574, 39 U.S.P.Q.2D (BNA) at 1526. In fact, it describes precious little with respect to design characteristics. The Board's suggestion that the design details were simply "a matter of design choice" evinces a misapprehension of the subject matter of design patents. E.g., *Carman*, 724 F.2d at 939 n.13, 220 U.S.P.Q. (BNA) at 486 n.13 ("Utility patents afford protection for the mechanical structure and function of an invention

whereas design patent protection concerns the ornamental or aesthetic features of a design.") Indeed, we note [*23] that the two design patents at issue here--the Dembiczak '023 and '254 patents--were considered nonobvious over each other, and were even the subject of a restriction requirement. *See 35 U.S.C. § 121 (1994)* ("If two or more independent and distinct inventions are claimed in one [*1003] application, the Commissioner may require the application to be restricted to one of the inventions."); *37 C.F.R. § 1.142*. The position adopted by the Board--that a textual description of facial indicia found in the claims of the utility patent application makes obvious the specific designs claimed in the (patentably distinct) Dembiczak design patents--would presumably render obvious, or even anticipate, all design patents where a face was depicted on a bag. But this, of course, is not the law; the textual description cannot be said to be a reference "basically the same as the claimed design," of the design patents at issue here. *Borden, 90 F.3d at 1574, 39 U.S.P.Q.2D (BNA) at 1526* (internal quotation marks omitted). The Board's conclusion of obviousness is incorrect.

Because we find that the Board erred in concluding that the design patents were obvious variants of the pending utility claims, we need not address [*24] the other prong of the two-way double patenting test--whether the pending utility claims are obvious variations of the subject matter claimed in the design patents. *See Carman, 724 F.2d at 939, 220 U.S.P.Q. (BNA) at 487* (both prongs of the two-way test required for obviousness-type double patenting). The double patenting rejections are reversed.

IV

Because there is no evidence in the record of a suggestion, teaching, or motivation to combine the prior art references asserted against the pending claims, the obviousness rejections are reversed. In addition, because the Board misapprehended the test for obviousness-type double patenting, and because the pending utility claims do not render obvious the design patents, the double patenting rejections are also reversed.

REVERSED

LEXSEE 535 F.2D 67

**IN THE MATTER OF THE APPLICATION OF MAMORU HIRAO and
YOSHINORI SATO**

Patent Appeal No. 76-560

UNITED STATES COURT OF CUSTOMS AND PATENT APPEALS

535 F.2d 67; 1976 CCPA LEXIS 162; 190 U.S.P.Q. (BNA) 15

May 27, 1976, DECIDED.

PRIOR HISTORY: [**1] Serial No. 839,689.

[*] and purifying [**2] and drying to obtain high purity maltose in crystalline powder form of 90 - 95% maltose; and then

OPINION BY: MILLER

OPINION

[*67] MILLER, Judge.

This appeal is from the decision of the Patent and Trademark Office Board of Appeals affirming the rejection of claims 1-4, 10, 17-19, 21, 22, and 24-26 in application serial No. 839,689, filed July 7, 1969, for "Process for Preparing Food and Drinks." We reverse.

The Invention

The invention involves a process of sweetening foods and drinks. The process comprises three steps, the first two being a method of forming a high purity maltose product (which is the sweetening agent) and the third being the use of this product to sweeten the food or drink. Claim 1, the sole independent claim, is illustrative (paragraphing and numbering added):

1. A process for preparing foods and drinks sweetened mildly, and protected against discoloration, Strecker's reaction, and moisture absorption, which comprises:

[1] adding [*] and [*] under such conditions and in a quantity sufficient to produce straight chain amylose, to enzymatically liquefied starch which consists essentially of [*68] amylopectin thereby producing straight-chain amylose;

[2] subjecting the resulting amylose to the action of

[3] adding said high purity crystalline maltose powder to foods and drinks as the essential added sweetener.

The Board's Opinion

The board, in a new ground of rejection under 37 CFR 1.196(b), found that all of the claims now before the court would have been obvious under 35 USC 103 in view of Jacobs (Jacobs, Chemistry and Technology of Food and Food Products 67-70 (1951)) together with Kjolberg (Kjolberg et al., Studies on Carbohydrate Metabolizing Enzymes, 86 J. BIOCHEMISTRY 258-62 (1963)). (The references are discussed infra under "Agreed Statement.") The board stated:

We wish to make it clear that while appellants' method of making high purity maltose appears to be unobvious based on the art of record before us, the method of sweetening food products with high purity maltose would be obvious from the teaching of Jacobs in view of Kjolberg.

In response to a request for reconsideration, the board further stated:

We note that appellants concede that the method of sweetening food products with high purity maltose would be obvious from the teachings of Jacobs in view of [**3] Kjolberg et al. As to claim 1, it is our considered opinion that, regardless of the process employed in preparing high purity maltose, it is obvious to use such high purity

maltose in sweetening food products.

Agreed Statement

This appeal comes before the court on an agreed statement of the case ¹ under court Rule 5.5. ² The following facts, among others, have been stipulated:

1 See *In re Hirao*, 525 F.2d 1066, 188 USPQ 248 (CCPA 1975).

2 Rule 5.5:

When the questions presented by an appeal to this court can be determined without an examination of all the pleadings, evidence, and proceedings below, the parties may submit an agreed statement of the case in lieu of the record as required by Rule 3.3(b) showing: (1) how the questions arose and were decided in the tribunal from which the appeal is taken; (2) the facts averred and proved or sought to be proved which are essential to a decision of the questions by this court; and (3) a concise statement of the issues to be decided and the points to be relied on by appellant. The statement shall be accompanied by a certified copy of the judgment or ruling appealed from and a certified copy of all opinions, if any, in support thereof.

[**4] 9. Claim 1 is an independent claim on which each of the remaining appealed claims depends, directly or indirectly.

10. The rejection of dependent claims 2 to 4, 10, 17 to 19, 21, 22 and 24 to 26 will stand or fall with the rejection of claim 1.

11. The sole issue to be decided by the present appeal is whether claim 1, and all those claims dependent therefrom, are obvious in the sense of 35 USC 103 over Jacobs in view of Kjolberg.

....

13. The Kjolberg reference teaches one process of making high purity maltose.

14. The Jacobs reference generally teaches that certain undefined maltose products may be used for sweetening food products.

15. Appellants' steps of making high purity maltose,

which appear as the first two steps in claim 1 ..., are novel and unobvious based on the art of record.

16. Appellants' step of adding high purity maltose to foods and drinks as the essential added sweetener, which appears as the third step in claim 1, ... would be obvious from the teachings of Jacobs in view of Kjolberg.

OPINION

As stipulated, the first two steps (forming high purity maltose) would have been unobvious from the art of record, while the [*69] third [*5] step (using high purity maltose as a sweetener) would have been obvious in view of Jacobs together with Kjolberg. Moreover, the Solicitor has stated - without contravention by appellants - that the high purity maltose product formed by the first two steps and the high purity maltose product of the prior art "may be considered the same as far as the process and use recited in the preamble and step [3] of claim 1 are concerned." Thus, the single issue is whether appellants' three-step process is obvious, the first two steps being unobvious but forming a known product, and the third step being the use of this known product in an obvious way. We conclude that due to the admitted unobviousness of the first two steps of the claimed combination of steps, the subject matter as a whole would not have been obvious to one of ordinary skill in the art at the time the invention was made. Cf. *In re Mancy*, 499 F.2d 1289, 182 USPQ 303 (CCPA 1974); *In re Kuehl*, 475 F.2d 658, 177 USPQ 250 (CCPA 1973).

The Solicitor argues that Kuehl and its progeny (including Mancy) are distinguishable, "inasmuch as the Court was there concerned with the obviousness of processes of using unobvious products," [**6] while here "the person of ordinary skill in the art has already been given the obvious, high purity maltose produced by other processes." However, this factual distinction does not preclude the applicability to the present case of the reasoning of Kuehl, where this court said (*supra* at 664-65, 117 USPQ at 255):

[We] think [*In re Saunders*, 33 CCPA 1001, 154 F.2d 693, 69 USPQ 341 (1946)] no longer represents viable law to the extent that it supports the broad proposition that the obviousness of process claims drawn to a method of using a composition is determined by asking ... whether "given" the composition the claimed process of use would be obvious. The test under § 103 is whether in view of the prior art the invention as a whole

would have been obvious at the time it was made, and the prior art here does not include the zeolite [the unobvious composition used] [Footnote omitted.]

Similarly here, it is improper to determine obviousness by merely asking whether, given the product of the two unobvious claimed steps, the third claimed step of using the product would have been obvious. The obviousness of the invention as a whole must be determined, and the unobvious [*7] first two steps are clearly part of the invention as a whole.

The Solicitor urges that the board committed no error in refusing to give weight to the specific method of making the high purity maltose. He analogizes the present claims to product-by-process claims, stating that "claim 1 may properly be viewed in short hand [sic] form as a 'process of using a product-by-process' claim," and argues that the method limitations of the first two steps should be given little or no weight. A product-by-process claim, although reciting the subject matter of the claim in terms of how it is made, is still a product claim. As this court said in *In re Brown*, 59 CCPA 1036, 1041, 459 F.2d 531, 535, 173 USPQ 685, 688 (1972):

[In] spite of the fact that the claim may recite only process limitations, it is the patentability of the Product claimed and not of the recited process steps which must be established.

Here, a three-step process is claimed - not the product formed by two steps of the process or the third step of using that product. Thus, the analogy to product-by-process claims is inapposite.³

³ At oral hearing, the Solicitor pointed out that some courts in infringement suits have construed

product-by-process claims as covering only a product made by the particular process set forth in the claims (see *In re Bridgeford*, 53 CCPA 1182, 1186 n.5, 357 F.2d 679, 682 n.5, 149 USPQ 55, 58 n.5 (1966)), and argued that these courts would treat the "process of using a product-by-process claim" and the present claims in the same manner. This court, however, as recognized by the Solicitor, does not construe product-by-process claims in an ex parte case as limited to the product formed by the specific process recited. *In re Avery*, 518 F.2d 1228, 186 USPQ 161 (CCPA 1975). If it did, the Solicitor's analogy to product-by-process claims would fall under its own weight.

[**8] [*70] The Solicitor points to the preamble of claim 1, which recites a "process for preparing foods and drinks sweetened mildly," as showing that the subject matter as a whole involves the use of an old sweetening agent in a very obvious manner. However, the preamble merely recites the purpose of the process; the remainder of the claim (the three process steps) does not depend on the preamble for completeness, and the process steps are able to stand alone. See *Kropa v. Robie*, 38 CCPA 858, 187 F.2d 150, 88 USPQ 478 (1951). The Solicitor's interpretation of the preamble would improperly broaden the scope of the claim.

In view of the foregoing, we hold that the subject matter as a whole would not have been obvious at the time the invention was made.

The decision of the board is reversed.

REVERSED

LEXSEE 441 F.3D 977

IN RE LEONARD R. KAHN

04-1616 (Serial No. 08/773,282)

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

441 F.3d 977; 2006 U.S. App. LEXIS 7070; 78 U.S.P.Q.2D (BNA) 1329

March 22, 2006, Decided

SUBSEQUENT HISTORY: Rehearing denied by, Rehearing, en banc, denied by *In re Kahn*, 2006 U.S. App. LEXIS 14563 (Fed. Cir., June 1, 2006)

PRIOR HISTORY: [*1] Appealed from: United States Patent and Trademark Office, Board of Patent Appeals and Interferences. *In re Kahn*, 147 Fed. Appx. 187, 2005 U.S. App. LEXIS 23087 (2005)

COUNSEL: Leonard R. Kahn, Pro se, of New York, New York.

John M. Whealan, Solicitor, Office of the Solicitor, United States Patent and Trademark Office, of Arlington, Virginia, for the Director of the United States Patent and Trademark Office. With him on the brief were Linda Monceys Isaacson and Raymond T. Chen, Associate Solicitors. Of counsel was Mary L. Kelly.

JUDGES: Before MICHEL, Chief Judge, LINN, and PROST, Circuit Judges.

OPINION BY: Linn

OPINION

[*980] LINN, *Circuit Judge*.

Leonard R. Kahn ("Kahn") appeals from the final decision of the Board of Patent Appeals and Interferences ("Board") concluding that claims 1-20 in patent application number 08/773,282 ("the '282 application") are unpatentable as obvious under 35 U.S.C. § 103.¹ Because the factual findings underlying the Board's conclusion are supported by substantial evidence, and

because the Board did not commit legal error in concluding that the claims would have been obvious, we affirm.

1 The Board also affirmed its own rejection of claims 21 and 22 as being non-enabled under 35 U.S.C. § 112, P1; however, in his opening brief on appeal Kahn withdrew those claims, leaving only claims 1-20 before us.

[*2] I. BACKGROUND

A. The Invention

The '282 application, filed on December 24, 1996 as a continuation-in-part of a series of continuing applications dating back to 1989, involves a "reading machine" that may be used by the blind. Prior to the application, machines that employed memory and display components by which material could be "read" using hand-held optical pens and speech synthesizers were known in the art. While a user can control these devices by hand to repeat words and to read at various speeds, such control is cumbersome, which makes it difficult for a blind user to study complex publications. Kahn addressed this problem and claims invention in a device that is operated by eye control and sound localization such that it can read out loud the word "looked at" by the user.

Kahn treats claims 1-20 as a group with claim 1 being representative:

1. A reading machine suitable for use by totally blind individuals for reading the complete text, or a selected portion thereof, of a document stored in storage

means, at the option of the user, comprising:

(a) means of storing at least a portion of the text of the document to be read,

(b) means for retrieving a selected [**3] portion of said stored text made available for immediate "reading,"

(c) means for producing an acoustical display of the selected portion of said stored text, in a page-like format,

(d) means for determining the location on the acoustical display towards which the user is "looking," and

(e) means for generating speech sounds verbalizing the word that is formatted to appear on the acoustical display at the location the user is "looking" towards.

A preferred embodiment of the '282 patent is illustrated below in Figure 1.

[SEE FIG. 1 IN ORIGINAL]

[*981] In operation,

the information being "read" . . . is fed through intermediate storage means to speech synthesizer means for converting the written information to electrical waves representing speech sounds. These electric waves are fed to . . . a four speaker array wherein the speakers are located in a fashion so that the artificial sound image can be placed at various points on the artificial screen or page allowing the user to hear the words at the desired locations. These locations would be selected by the user looking at a specific location on the artificial screen or page.

The user would then move his or her [**4] eyes to "look" where the next word would be expected to appear, i.e., directly to the right of the spoken word. This would then cause the next word to be

"spoken" and the sound image would appear slightly to the right. This motion is achieved by energizing the four speaker array with different levels of audio power. . . .

When the user completes the "reading" of the last word on the page, . . . the reader would have the option of rereading a section on the page or causing the page to be "turned." If the user wishes to reread . . . , he can direct his attention to the material to be reread by "looking" at the portion of the page where he remembers hearing the material.

On the other hand, if he wishes to continue reading the material he can turn the page by looking along the bottom line past the right hand edge of the "page". The first word on the new page would be heard when the reader directed his or her attention to the upper left hand corner of the page where the first word on the new page would be expected.

'282 application at 11-13.

According to the specification, the device can employ a conventional scanner to input data; a conventional character recognition device [**5] to translate and send data to a storage device; and a page generator to take data from the storage device and format it for a visual display and for a word selector, the latter of which can send the data to a conventional speech synthesizer. After an optical sensor detects where a user is "looking" and a word is "selected" for vocalization, the synthesizer feeds an audio signal to a localizer control. [**982] Loud speakers are arranged at the corners of the "page" to allow the user to confirm localization of sound. The specification further indicates that

there are a number of devices available for sensing where an individual is looking. For example, *Garwin et. al. 4,595,990* . . . , *Anderson et. al. 4,579,533* . . . and *Stanton 4,322,744* More specifically, Anderson's [sic] patent discusses feed-back which may be visual, auditory or tactile to verify decisions by eye control

equipment.

However, such inventions are not suitable for totally blind individuals who are not verifying where they are looking but are using their eyes to direct which part of the artificial page should be read to produce a sound image. This makes essential a two dimensional stereo sound stage which the blind [*6] person solely depends upon.

'282 application at 16.

B. The Prior Art

The Board's rejection was based on Garwin et al., *U.S. Patent No. 4,595,990* (issued June 17, 1986) ("Garwin"), in view of Anderson et al., *U.S. Patent No. 4,406,626* (issued Sept. 27, 1983) ("Anderson '626"), Anderson et al., *U.S. Patent No. 4,579,533* (issued April 1, 1986) ("Anderson '533"), and Stanton, *U.S. Patent No. 4,322,744* (issued March 30, 1982) ("Stanton"). The Board alternatively used *Anderson '626* or '533 as primary references.

Garwin discloses an eye-controlled interactive information processor that senses the portion of a visual display at which the user is looking. The processor is connected to the display, which, in turn, can be partitioned so that different information is displayed in discrete areas. By gazing in different directions, the user informs the processor of the displayed item that is selected. Garwin, col. 2, ll. 60-68. The preferred embodiment employs a reflected light eye-tracking device to determine where the user is looking. *Id.*, col. 3, l. 66-col. 4, l. 62. The eye-interactive control generally uses a technique where the user is presented with a number of targets having [*7] some meaning, such as "words or phrases" displayed on screen. *Id.*, col. 9, ll. 62-67. "Visual, auditory or tactile" feedback is then given to the user to indicate that a selection has been received. *Id.*, col. 2, ll. 10-11; col. 11, ll. 59-64. The user then can verify or cancel the selection. *Id.*, col. 10, ll. 1-6. Garwin states that "it will be apparent to one skilled in the art that . . . the benefits of the invention will be achieved by many types of apparatus." *Id.*, col. 2, ll. 50-53. It can be used for "requesting display of a page of text from a . . . table of contents," *id.*, col. 3, ll. 42-44, or "[other] presentation of textual material," *id.*, col. 10, ll. 31-33.

Anderson '626 discloses an interactive "electronic teaching aid" which enables a user viewing text on a display to designate any words or portion of text for immediate audible vocalization. *Anderson '626*, col. 1, l. 8; col. 2, ll. 11-17. The components include: a selector switch, which when in the "text" position, causes data to be transmitted to a monitor and displayed in legible form, *id.*, col. 3, ll. 27-31; an advance button, which when depressed allows the user to select and retrieve [*8] the next page of text from memory, *id.*, col. 3, ll. 31-41; a memory, which can store each word of the text coded for speech, *id.*, col. 3, l. 66-col. 4, l. 6; and a word designator light pen, which the user can place on a word to hear the word vocalized through the speaker, *id.*, col. 3, ll. 54-68; col. 10, ll. 51-58. *Anderson '533* discloses an improved microprocessor-based version of *Anderson '626*. *Anderson '533*, col. 1, ll. 19-24, 41-56.

[*983] Stanton discloses an acoustical imaging system for use by visually impaired individuals that uses horizontal and vertical directional sound to represent visual aspects of an environment. Stanton states that a user can locate "the position of a virtual sound source as representing a point in space" such that different signals may represent different directions. Stanton, col. 1, ll. 58-61. The preferred embodiment features four loud speakers or transducers mounted at the corners of a vertical display panel. *Id.*, col. 2, ll. 54-55. When the user moves the cursor, the sound emanating from the speakers is phase shifted to produce a virtual sound seeming to come from a particular location related to the position of the cursor. *Id.*, col. [*99] 1, l. 66-col. 2, l. 2; col. 2, ll. 55-63. In another embodiment, a quadraphonic headset is used in place of the transducers to achieve the effect of producing a virtual sound identifying a position. *Id.*, col. 4, ll. 26-35. Stanton states that the device may be used as a "rudimentary reading device." *Id.*, col. 1, ll. 62.

C. The Board Decisions

Kahn filed the '282 application with 22 claims as a continuation-in-part of application number 07/645,102 ("the '102 application"), which was filed in 1991. The '102 application was a continuation-in-part of a series of abandoned continuing applications dating back to application number 07/338,597, which was filed in 1989. While claims 21 and 22 of the '282 application are not at issue in this appeal, the Board addressed those claims on several occasions, which led to the creation of a substantial Board history. As a result, the final decision

with respect to the obviousness rejection of claims 1-20 spans three decisions, which include *Ex Parte Kahn*, No. 2004-1091 (B.P.A.I. June 30, 2004) ("*2004 decision*"); *Ex Parte Kahn*, No. 2000-1130 (B.P.A.I. Feb. 24, 2003) ("*2003 decision*"); and *Ex Parte Kahn*, No. 94-2233 (B.P.A. [**10] I. Sept. 21, 1995) ("*1995 decision*").

In its 1995 decision, after reversing the examiner's anticipation rejection, the Board *sua sponte* rejected the relevant claims under § 103. The Board found that Garwin taught "the concepts of determining where on a display screen a user is 'looking' . . . and giving either visual or *auditory* feedback to the user" and that "while nothing specific is said as to acoustically reproducing a word displayed at that location, common sense . . . indicates that such an *auditory* feedback response is appropriate in view of such auditory feedback confirmation clearly suggested by Anderson '533 or '626." *1995 decision*, slip op. at 5 (emphasis in original). The Board found that "to whatever extent Garwin is not concerned with text *per se*, [the Anderson] references are" and "teach the advantages of text display with audio reproduction," concluding that

the artisan would have found it to have been obvious to have modified Garwin for display of text passages and selection of works therefrom with vocalization thereof as feedback confirmation, all as taught by Anderson '626 or '533 . . . [or] to have modified either of these Anderson [**11] references to use the eye control of Garwin so that the user's hands would have been free for other tasks.

Id., slip op. at 5-6. The Board found that Stanton "teaches the benefit of acoustic imaging in reading systems" and that "it would have, thus, been further obvious to the artisan to add advantageous acoustic imaging to either of the above-noted modified devices of Garwin or the Anderson patents which would have word positions acoustically and visually indicated." *Id.*, slip op. at 6.

In its *2003 decision*, the Board expressly incorporated the findings and rationale [*984] from both its *1995 decision* and the Examiner's Answer filed on April 24, 2000. *2003 decision*, slip op. at 3-4. In the Answer, the Examiner had explained that Garwin teaches "a buffer memory which stores at least a portion of the information derived from sensing means and means for

subsequently retrieving the sensed information," "means for displaying stored written text," and "means for determining which word of the displayed text the user is looking towards"; that Anderson '626 teaches "means for generating speech sounds verbalizing the looked at word"; and that Stanton teaches "means for [**12] verbalizing each word the user's eyes are directed towards in two dimensional stereo." Examiner's Answer at 5-6. Rejecting Kahn's argument that hindsight drove the combination of references, the Board reiterated that the rationale of the 1995 decision was correct and explained that motivation "clearly is based upon a prospective look at the state of the art." *2003 decision*, slip op. at 8-11.

The Board addressed several other arguments. First, the Board rejected the argument that the invention's intended use supports patent ability, noting that "the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus [from] a prior art apparatus satisfying the claimed structural limitations." *Id.* at 5-6. Second, the Board rejected the argument that because "the purposes of the [prior art] references . . . are different from the [invention's] purpose," the invention is non-obvious, explaining that "the law . . . does not require that references be combined for reasons contemplated by an inventor" and that "prior art need not suggest the same problem set forth by appellant." *Id.* at 6-7. Third, the Board rejected the arguments that [**13] features of a secondary reference be capable of incorporation into the structure of a primary reference and that the invention be suggested completely by one reference. *Id.* at 7. Finally, the Board rejected a "long-felt need" argument, explaining that Khan had not presented any objective evidence of a long-standing problem or long-standing need in the art. *Id.* at 11-12.

In its *2004 decision*, the Board entered a final rejection of claims 1-20 based on its *2003 decision*. Khan timely appealed to this court. We have jurisdiction pursuant to 28 U.S.C. § 1295(a)(4)(A).

II. DISCUSSION

A. The Parties' Arguments

Khan advances two main arguments. First, Khan asserts that the Board's finding of motivation to combine was unsupported by substantial evidence. Citing *In re Lee*, 277 F.3d 1338 (Fed. Cir. 2002), and *In re Rouffet*,

149 F.3d 1350 (Fed. Cir. 1998), Khan argues that the Board overstated the knowledge of the skilled artisan and employed improper hindsight. Specifically, Khan asserts that a skilled artisan would not have sought to augment Garwin with sound because the resulting device would be more expensive and [*14] less reliable for the purpose intended by Garwin. He contends that just because Stanton teaches use of sound to confirm a visual perception of a shape like a letter—which provides a “rudimentary” reading capability—does not mean that the reference teaches how to enable a blind user to “read” and “reread” entire words and phrases quickly. Khan further contends that Stanton teaches away from a system that employs iris eye direction sensing because Stanton requires the user to hold his head steady, because eyes are not involved in his localization procedure, and because the combined device would be expensive and inoperable. Second, Khan argues that the court should take “judicial notice” that his [*985] reading machine addresses a “long-felt, but unresolved need,” and that this consideration is sufficient to rebut a *prima facie* case of obviousness.

The Patent and Trademark Office (“PTO”) counters that *Lee* and *Rouffet* are distinguishable because here the Board identified motivations to combine the references based on specific statements in the references and on the nature of the problem to be solved. As to long-felt need, the PTO argues that Kahn proffered no actual evidence, and [*15] that Kahn’s argument alone is insufficient to rebut a *prima facie* case.

B. Standard of Review

A claimed invention is unpatentable if the differences between it and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the pertinent art. 35 U.S.C. § 103(a) (2000); *Graham v. John Deere Co.*, 383 U.S. 1, 13-14, 86 S. Ct. 684, 15 L. Ed. 2d 545 (1966). The ultimate determination of whether an invention would have been obvious is a legal conclusion based on underlying findings of fact. *In re Dembiczak*, 175 F.3d 994, 998 (Fed. Cir. 1999). We review the Board’s ultimate determination of obviousness *de novo*. *Id.* However, we review the Board’s underlying factual findings, including a finding of a motivation to combine, for substantial evidence. *In re Gartside*, 203 F.3d 1305, 1316 (Fed. Cir. 2000).

Substantial evidence is something less than the

weight of the evidence but more than a mere scintilla of evidence. *Id.* at 1312 (citing *Consol. Edison Co. v. NLRB*, 305 U.S. 197, 229-30, 59 S. Ct. 206, 83 L. Ed. 126 (1938)). [*16] It means such relevant evidence as a reasonable mind might accept as adequate to support a conclusion. *Consol. Edison*, 305 U.S. at 229-30. In reviewing the record, we must take into account evidence that both justifies and detracts from the factual determinations. *Gartside*, 203 F.3d at 1312 (citing *Universal Camera Corp. v. NLRB*, 340 U.S. 474, 487-88, 71 S. Ct. 456, 95 L. Ed. 456 (1951)). We note that the possibility of drawing two inconsistent conclusions from the evidence does not prevent the Board’s findings from being supported by substantial evidence. *Id.* Indeed, if a reasonable mind might accept the evidence as adequate to support the factual conclusions drawn by the Board, then we must uphold the Board’s determination. *Id.*

C. Analysis

In assessing whether subject matter would have been non-obvious under § 103, the Board follows the guidance of the Supreme Court in *Graham v. John Deere Co.* The Board determines “the scope and content of the prior art,” ascertains “the differences between the prior art and the claims at” issue, and resolves “the level of ordinary skill in the pertinent” art. *Dann v. Johnston*, 425 U.S. 219, 226, 96 S. Ct. 1393, 47 L. Ed. 2d 692 (1976) [*17] (quoting *Graham*, 383 U.S. at 17). Against this background, the Board determines whether the subject matter would have been obvious to a person of ordinary skill in the art at the time of the asserted invention. *Graham*, 383 U.S. at 17. In making this determination, the Board can assess evidence related to secondary indicia of non-obviousness like “commercial success, long felt but unresolved needs, failure of others, etc.” *Id.*, 383 U.S. at 17-18; accord *Rouffet*, 149 F.3d at 1355. We have explained that

to reject claims in an application under section 103, an examiner must show an un rebutted *prima facie* case of obviousness On appeal to the Board, an applicant can overcome a rejection by [*986] showing insufficient evidence of *prima facie* obviousness or by rebutting the *prima facie* case with evidence of secondary indicia of nonobviousness.

Rouffet, 149 F.3d at 1355.

Most inventions arise from a combination of old elements and each element may often be found in the prior art. *Id.* at 1357. However, mere identification in the prior art of each element is insufficient to defeat [*18] the patentability of the combined subject matter as a whole. *Id.* at 1355, 1357. Rather, to establish a *prima facie* case of obviousness based on a combination of elements disclosed in the prior art, the Board must articulate the basis on which it concludes that it would have been obvious to make the claimed invention. *Id.* In practice, this requires that the Board "explain the reasons one of ordinary skill in the art would have been motivated to select the references and to combine them to render the claimed invention obvious." *Id.* at 1357-59. This entails consideration of both the "scope and content of the prior art" and "level of ordinary skill in the pertinent art" aspects of the *Graham* test.

When the Board does not explain the motivation, or the suggestion or teaching, that would have led the skilled artisan at the time of the invention to the claimed combination as a whole, we infer that the Board used hindsight to conclude that the invention was obvious. *Id.* at 1358. The "motivation-suggestion-teaching" requirement protects against the entry of hindsight into the obviousness analysis, a problem which § 103 was meant [*19] to confront. See 35 U.S.C. § 103 (stating that obviousness must be assessed "at the time the invention was made"); *Dembiczak*, 175 F.3d at 998 ("It is this phrase that guards against entry into the tempting but forbidden zone of hindsight." (internal quotations omitted)); Giles S. Rich, *Laying the Ghost of the Invention Requirement*, 1 APLA Q.J. 26-45 (1972), reprinted in 14 Fed. Cir. B.J. 163, 170 (2004) ("To protect the inventor from hindsight reasoning, the time is specified to be the time when the invention was made.") (emphasis in original). The Supreme Court recognized the hindsight problem in *Graham* and proposed that "legal inferences" resulting from "secondary considerations" might help to overcome it. 383 U.S. at 36 ("[Secondary considerations] may also serve to guard against slipping into use of hindsight, and to resist the temptation to read into the prior art the teachings of the invention in issue." (internal quotations omitted)). By requiring the Board to explain the motivation, suggestion, or teaching as part of its *prima facie* case, the law guards against hindsight [*20] in all cases--whether or not the applicant offers evidence on secondary considerations--which advances Congress's goal of creating a more practical, uniform, and definite test for

patentability. See *Dann*, 425 U.S. at 225-26 ("It was only in 1952 that Congress, in the interest of 'uniformity and definiteness, articulated the requirement in a statute." (quoting S. Rep. No. 1979, at 6 (1952); H.R. Rep. No. 1923, at 7 (1952))); *Graham*, 383 U.S. at 17 ("The § 103 [test], when followed realistically, will permit a more practical test of patentability.").

Although our predecessor court was the first to articulate the motivation-suggestion-teaching test, a related test--the "analogous art" test--has long been part of the primary *Graham* analysis articulated by the Supreme Court. See *Dann*, 425 U.S. at 227-29; *Graham*, 383 U.S. at 35. ² The [*987] analogous-art test requires that the Board show that a reference is either in the field of the applicant's endeavor or is reasonably pertinent to the problem with which the inventor was concerned in order to rely on that reference as a basis for rejection. *In re Oetiker*, 977 F.2d 1443, 1447 (Fed. Cir. 1992). [*21] References are selected as being reasonably pertinent to the problem based on the judgment of a person having ordinary skill in the art. *Id.* ("It is necessary to consider 'the reality of the circumstances, in other words, common sense--in deciding in which fields a person of ordinary skill would reasonably be expected to look for a solution to the problem facing the inventor." (quoting *In re Wood*, 599 F.2d 1032, 1036 (C.C.P.A. 1979))). We have explained that this test begins the inquiry into whether a skilled artisan would have been motivated to combine references by defining the prior art relevant for the obviousness determination, and that it is meant to defend against hindsight. See *id.*; *In re Clay*, 966 F.2d 656, 659-60 (Fed. Cir. 1992). ³

2 In *Graham*, Cook Chemical challenged the court's reliance on a reference that it believed was not in a "pertinent prior art," arguing that while the invention involved a container having a "pump sprayer," the reference related to containers having "pouring spouts." 383 U.S. at 35. In reaching the conclusion that the claimed subject matter was obvious, the Court rejected Cook's argument, explaining that the problem to be solved was a mechanical closure problem and that a closure device in such a closely related art was a pertinent reference. *Id.* Similarly, in *Dann*, the invention involved the use of automatic data processing equipment to analyze transactions within a single bank account. 425 U.S. at 227-28. The *Dirk* reference that the Court relied upon in

making its obviousness case involved a similar system used in a non-banking context. *Id.* at 228. Citing *Graham*, the Court explained that a person of ordinary skill in the art would be aware of this reference and the Court could rely upon it in making its obviousness case because "while the Dirk's invention is not designed specifically for application to the banking industry many of its characteristics and capabilities are similar to those of respondent's system." *Id.* at 229.

[**22]

3 In *In re Clay*, we reasoned that

if a reference disclosure has the same purpose as the claimed invention, the reference relates to the same problem, and that fact supports use of that reference in an obviousness rejection. An inventor may well have been motivated to consider the reference when making his invention. If it is directed to a different purpose, the inventor would accordingly have had less motivation or occasion to consider it.

966 F.2d at 659-60. In *In re Oetiker*, we held that "the combination of elements from non-analogous sources, in a manner that reconstructs the applicant's invention only with the benefit of hindsight, is insufficient to present a *prima facie* case of obviousness." 977 F.2d at 1447.

The motivation-suggestion-teaching test picks up where the analogous art test leaves off and informs the *Graham* analysis. To reach a non-hindsight driven conclusion as to whether a person having ordinary skill in the art at the time of the invention would have viewed the subject matter as a whole to have been obvious in view of multiple references, the Board must provide some rationale, articulation, [**23] or reasoned basis to explain why the conclusion of obviousness is correct. The requirement of such an explanation is consistent with governing obviousness law, *see* § 103(a); *Graham*, 383 U.S. at 35; *Dann*, 425 U.S. at 227-29, and helps ensure predictable patentability determinations.

A suggestion, teaching, or motivation to combine the relevant prior art teachings does not have to be found

explicitly in the prior art, as

the teaching, motivation, or suggestion may be implicit from the prior art as a whole, rather than expressly stated in the references. . . . The test for an implicit [*988] showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art.

In re Kotzab, 217 F.3d 1365, 1370 (Fed. Cir. 2000) (internal citations omitted). However, rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness. *See Lee*, 277 F.3d at 1343-46; [**24] *Rouffet*, 149 F.3d at 1355-59. This requirement is as much rooted in the Administrative Procedure Act, which ensures due process and non-arbitrary decisionmaking, as it is in § 103. *See id.* at 1344-45.

In considering motivation in the obviousness analysis, the problem examined is not the specific problem solved by the invention but the general problem that confronted the inventor before the invention was made. *See, e.g., Cross Med. Prods., Inc. v. Medtronic Sofamor Danek, Inc.*, 424 F.3d 1293, 1323 (Fed. Cir. 2005) ("One of ordinary skill in the art need not see the identical problem addressed in a prior art reference to be motivated to apply its teachings."); *Ecologchem, Inc. v. S. Cal. Edison Co.*, 227 F.3d 1361, 1372 (Fed. Cir. 2000) ("Although the suggestion to combine references may flow from the nature of the problem, 'defining the problem in terms of its solution reveals improper hindsight in the selection of the prior art relevant to' obviousness. (internal citation omitted) (quoting *Monarch Knitting Mach. Corp. v. Sulzer Morat GmbH*, 139 F.3d 877, 881 (Fed. Cir. 1998)); *In re Beattie*, 974 F.2d 1309, 1312 (Fed. Cir. 1992) [**25] ("The law does not require that the references be combined for the reasons contemplated by the inventor."); *Princeton Biochemicals, Inc. v. Beckman Coulter, Inc.*, 411 F.3d 1332, 1337 (Fed. Cir. 2005) (characterizing the relevant inquiry as "[would] an artisan of ordinary skill in the art at the time of the invention, confronted by the same problems as the inventor and with no knowledge of the

claimed invention,[] have selected the various elements from the prior art and combined them in the manner claimed"); see also *Graham*, 383 U.S. at 35 (characterizing the problem as involving mechanical closures rather than in terms more specific to the patent in the context of determining the pertinent prior art). Therefore, the "motivation-suggestion-teaching" test asks not merely what the references disclose, but whether a person of ordinary skill in the art, possessed with the understandings and knowledge reflected in the prior art, and motivated by the general problem facing the inventor, would have been led to make the combination recited in the claims. See *Cross Med. Prods.*, 424 F.3d at 1321-24. From this it may be determined whether [*26] the overall disclosures, teachings, and suggestions of the prior art, and the level of skill in the art--i.e., the understandings and knowledge of persons having ordinary skill in the art at the time of the invention--support the legal conclusion of obviousness. See *Princeton Biochemicals*, 411 F.3d at 1338 (pointing to evidence supplying detailed analysis of the prior art and the reasons one of ordinary skill would have possessed the knowledge and motivation to combine).

In this case, Khan does not dispute that each element of his claimed invention can be found in either Garwin, Anderson '533 and '626, or Stanton, or that each reference lies in the pertinent art. Nor does Khan take issue with the Board's finding that a person having ordinary skill in the art would have been motivated to modify Anderson '533 or '626 in view of [*989] Garwin, or vice versa. See Garwin, col. 2, ll. 50-53, col. 10, ll. 31-35 (stating that "it will be apparent to one skilled in the art that . . . the benefits of the invention will be achieved by many types of apparatus" which may be "virtually [any device] susceptible of control by a computer, including . . . [those geared] to presentation [*27] of textual material").

Rather, Khan's challenge to the sufficiency of the evidence supporting the Board's *prima facie* case is directed at the motivation to apply the teachings of Stanton to achieve the claimed invention. In the 1995 decision, the Board found that Stanton "teaches the benefit of acoustic imaging in reading systems." The Board carefully examined the Anderson/Garwin combination and recognized that a skilled artisan confronted with the problem faced by Kahn would have been led by the teaching of Stanton "to add advantageous acoustic imaging" to the Anderson/Garwin combination so that it would have "word positions acoustically and

visually indicated."

Stanton teaches that "[its] invention relates to augmentation of vision of those who have lost vision or have had their visual faculties diminished," col. 1, ll. 6-8, that it is "useful in teaching a deprivee to apprehend the position of a virtual sound source as representing a point in space," *id.*, ll. 58-59, and that it may be used as a "rudimentary reading device," *id.*, ll. 61-62. A skilled artisan, who knows of a "learning machine" that is capable of reading a word aloud by selecting the word on the screen [*28] at which the user is looking and seeks to provide a visually-impaired user better control over word localization, ⁴ would have reason to solve that problem by adding two-dimensional sound in view of Stanton's express teaching that two-dimensional sound can be used to "substitute" for the lost sense of sight, to locate a point in space, and to create a "rudimentary reading device" for the visually impaired. See *Cross Med. Prods.*, 424 F.3d at 1323 (holding that "one of ordinary skill in the art need not see the identical problem addressed in a prior art reference to be motivated to apply its teachings"). Because the Board need only establish motivation to combine by a preponderance of the evidence to make its *prima facie* case, see *In re Glaug*, 283 F.3d 1335, 1338 (*Fed. Cir.* 2002), we conclude that substantial evidence supports the finding of a motivation to combine the teachings of Stanton to the Anderson/Garwin combination. Although a reasonable person might reach the opposite conclusion, there is far more than a "mere scintilla" of evidence present from which a reasonable mind could find a motivation to combine.

4 Kahn does not argue that one of ordinary skill in the art at the time of the invention would be unaware of the nature of this problem, and there is nothing in the record to suggest this to be the case, unlike the facts in the decision of our predecessor court in *In re Sponnoble*, 56 C.C.P.A. 823, 405 F.2d 578 (C.C.P.A. 1969).

[**29] We reject Khan's argument that the Board overstated the knowledge of the person having ordinary skill in the art or employed improper hindsight in making its *prima facie* case. In both *Lee* and *Rouffet*, the Board recognized that the knowledge of the skilled artisan could provide the motivation to combine but concluded that no such knowledge was articulated and placed on the record. *Lee*, 277 F.3d at 1343-45; *Rouffet*, 149 F.3d at 1357-59.

In this case, motivation to combine was articulated and placed on the record. As to the Anderson/Garwin combination, the Board identified the desire to free up the hands of the Anderson user as the problem confronted and found that Garwin itself evidenced the broad applicability of its optical [*990] controls to the claimed invention. As to the addition of Stanton, the Board identified express teachings in Stanton of "the benefit of acoustic imaging in reading systems" and properly related those teachings to the Anderson/Garwin combination.

We find Khan's remaining arguments unpersuasive. First, even if applying Stanton to Garwin resulted in a device that would be less effective for the purpose intended by Garwin, [*30] the teaching of the Garwin reference is not limited to the specific invention disclosed. *See In re Heck*, 699 F.2d 1331, 1333 (Fed. Cir. 1983) (explaining that "the use of patents as references is not limited to what the patentees describe as their own inventions" (internal quotations omitted)). As noted above, Garwin states that his invention is intended to be applied to "virtually [any device] susceptible of control by a computer, including . . . [those geared] to presentation of textual material," Garwin, col. 2, ll. 50-53; col. 10, ll. 31-35. Second, although Khan may have envisioned something different than the skilled artisan when he looked at Stanton because Stanton teaches only a *rudimentary* reading device, the skilled artisan need not be motivated to combine Stanton for the same reason contemplated by Khan. *See In re Beattie*, 974 F.2d 1309, 1312 (Fed. Cir. 1992) ("As long as some motivation or suggestion to combine the references is provided by the prior art taken as a whole, the law does not require that the references be combined for the reasons contemplated by the inventor." (citing *In re Kronig*, 539 F.2d 1300, 1304 (C.C.P.A. 1976))). [*31] Third, Khan's argument that Stanton itself teaches away from the combination with Garwin lacks support in the reference. "A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant." *In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994). Nothing in Stanton can be said to discourage a person having

ordinary skill in the art from using the visual-input control taught in Garwin in the claimed combination or to lead the skilled artisan in a direction divergent from the path taken by Kahn.

Finally, we note that Kahn had an opportunity to rebut the Board's *prima facie* case by offering evidence of objective indicia of non-obviousness. Khan put on no evidence, but invites this court to take "judicial notice" of the long-felt but unresolved need for a device that will help the blind read. We must decline Khan's invitation for the following reasons. First, "long-felt but unresolved need" is not the kind of undisputed fact to which courts are accustomed to taking "judicial notice" because [*32] a finding either way can "reasonably be questioned." *See Fed. R. Evid. 201(b)* ("A judicially noticed fact must be one not subject to reasonable dispute in that it is either (1) generally known within the territorial jurisdiction of the trial court or (2) capable of accurate and ready determination by resort to sources whose accuracy cannot reasonably be questioned."); *In re Fielder*, 471 F.2d 640, 642-43 (C.C.P.A. 1973) (declining to take judicial notice of prior art references that appellant submitted as objective evidence of non-obviousness because appellant did not offer references to the Board and they were not part of the record). Second, our precedent requires that the applicant submit actual evidence of long-felt need, as opposed to argument. This is because "absent a showing of long-felt need or the failure of others, the mere passage of time without the claimed invention is not evidence of nonobviousness." *Iron Grip Barbell Co. v. USA Sports, Inc.*, 392 F.3d 1317, 1325 [*991] (Fed. Cir. 2004); accord *In re Wright*, 569 F.2d 1124, 1127 (C. C.P.A. 1977).

III. CONCLUSION

Because the factual findings [*33] underlying the Board's analysis, including the findings on motivation to combine, are supported by substantial evidence, we conclude that the Board did not err in rejecting claims 1-20 as *prima facie* obvious. Because Khan did not rebut the Board's *prima facie* case, the Board's decision is

AFFIRMED.

LEXSEE 526 F.2D 1399

**IN THE MATTER OF THE APPLICATION OF ERIK REGEL, KARL HEINZ
BUCHEL and MANFRED PLEMPER**

Patent Appeal No. 75-570

UNITED STATES COURT OF CUSTOMS AND PATENT APPEALS

526 F.2d 1399; 1975 CCPA LEXIS 102; 188 U.S.P.Q. (BNA) 136

December 18, 1975, Decided.

PRIOR HISTORY: [*1] Serial No. 873,098.

R(1) is hydrogen, alkyl of 1 to 4 carbon atoms or phenyl,

OPINION BY: BALDWIN

R(2) and R(3) are the same or different and are hydrogen, alkyl of 1 to 4 carbon atoms or phenyl,

OPINION

[**2] X and Y are the same or different and are halogen, NO(2), CN, alkyl of 1 to 12 carbon atoms,

[*1399] BALDWIN, Judge.

S-alkyl of 1 to 4 carbon atoms or alkoxy of 1 to 4 carbon atoms, and

This is an appeal from the decision of the Patent and Trademark Office Board [*1400] of Appeals affirming the examiner's rejection of claims 2, 6 and 19¹ of appellants' application² entitled "Bis-imidazolyl-bisphenylmethane, Salts Thereof and Processes for Their Production." We reverse.

m is 0, 1 or 2, and

n is 1 or 2 or m is 1 or 2 and n is 0, 1 or 2.

1 Claim 19 was rejected under 35 USC 112, second paragraph. Further discussion of this claim is unnecessary. Appellants have withdrawn their appeal of claim 19 by motion dated June 5, 1975.

6. A compound according to claim 2 wherein R(1) is hydrogen or alkyl of 1 to 4 carbon atoms, R(2) and R(3) are hydrogen, X and Y are the same or different and are halogen, CN, NO(2), methoxy or methyl and n is 0 or 1.

2 Serial No. 873,098, filed October 31, 1969.

References

The Invention

Fournari et al., Bull. Soc. Chim. France, No. 356 (1968), pages 2438-46 (hereafter Fournari).

Appellants claim certain derivatives of bis-imidazolyl-bisphenylmethane which are disclosed as being non-toxic and pharmaceutically acceptable antimycotics especially useful against dermatomycosis and also against yeast infections of the skin and internal organs. The claims on appeal are as follows:

Mussell et al. 3,321,366 May 23, 1967 (filed Nov. 15, 1965) (hereafter Mussell).

Tolkmath et al., Science, Vol. 158 (1967), pages 1462-63 (hereafter Tolkmath).

2. A compound of the formula:

Fournari discloses various methods of preparing N-substituted imidazole derivatives. Once prepared, the spectra of the various imidazoles were analyzed to determine the exact chemical structures of the compounds. Of the numerous materials studied, three

[Graphic omitted. See illustration in original.]

wherein

were found of particular interest by the Patent and Trademark Office in formulating its rejection (which will be discussed in detail):

[Graphic omitted. See illustration in original.]

[*1401] Mussell [**3] discloses the use of certain substituted tritylimidazole compounds ⁴ "for the control of a wide range of fungi, especially those fungal organisms ordinarily found on the aerial portions of plants." In addition, Mussell teaches that:

4 Mussell's tritylimidazoles are taught to have the following generic structure:

[Graphic omitted. See illustration in original.]

wherein each R independently represents a member selected from the group consisting of halo and lower alkyl and n represents an integer of from 0 to 2, both inclusive, further limited in that one of the 2 and 6 positions is unsubstituted; and each X independently represents hydrogen, lower alkyl, or phenyl, the total number of carbon atoms in all X substituents being an integer of from 0 to 15, both inclusive.

It is an advantage of the present invention that compositions containing these compounds can be applied to growing vegetation in amounts required for effective control without significant injury to the plants. It is a further advantage that the compounds of the present invention are of very low toxicity to mammals.

Last, the Tolkmith article presents the results of a study of certain substituted imidazoles [**4] and concludes that:

[Imidazoles] substituted on the imine nitrogen atom are likely to be active if the substituent is electron-attracting, and if the atom connecting it to the imidazolyl moiety has tetrahedral geometry. Fungitoxicity is high with phosphinamidothionate and triarylmethyl groups as substituents. The presence of an asymmetric phosphorus atom in the substituent has no effect on fugitoxicity, but affects mammalian toxicity.

Tolkmith began by studying the properties of N,N-diethyl imidazol-1-yl phenylphosphinamidothionate 5 and noted that it "showed high fungitoxicity, low mammalian toxicity, and very little anticholinergic

activity." It was then hypothesized that the fungitoxic action of the above-recited compound should not be drastically changed if the entire phosphinamidothionate group were replaced by a phosphorus-free substituent of equivalent stereoelectronic nature. In order to test this hypothesis, several materials were tested, including:

5 [Graphic omitted. See illustration in original.]

[Graphic omitted. See illustration in original.]

The tritylimidazole was found to be nearly as active as the reference compound, while demonstrating [**5] "moderate mammalian toxicity."

The Rejection

The board affirmed the examiner's rejection of claims 2 and 6 as being unpatentable (35 USC 103) over (1) Fournari, (2) Fournari in view of Mussell, and (3) Fournari in view of Mussell and Tolkmith. Noting that Fournari does not disclose any utility for the compounds recited therein, the board stated:

At the outset we point out that appellants' invention (i.e., that which is claimed) is a chemical compound or group of compounds; it is not the method of using the compound or of treating humans or animals infected with pathogenic fungi.

[*1402] Our consideration of the references convinces us that not only would the claimed alkyl or methyl analogue have been obvious, its usefulness as a fungicide also would have been equally obvious. For example, Tolkmith et al. indicate that the fungicidal activity is primarily due to the imidazole moiety of the compound and that the remainder of said compound (a triphenylmethyl group in the case of compound II) "is not in fact critical for high fungicidal activity." Mussell et al. additionally indicate that in imidazole-substituted phenylmethane fungicides both the methyl-substituted phenyl [**6] and unsubstituted phenyl derivatives possess fungicidal activity. Consequently anyone skilled in the art would expect not only the Fournari et al. bis-imadazolyl-bisphenylmethane to possess fungicidal activity but would also expect similar activity for the corresponding methyl-substituted analogue.

* * *

Regarding appellants' argument based on the fact that the art does not suggest the treatment of fungal

infections pathogenic to human beings and other animals, it is the Examiner's position that this fact, under the circumstances herein, is not significant. As we have set forth above, the claimed methyl analogue of the Fournari et al. bis-imidazolyl-bisphenylmethane, as well as its use as a fungicide would have been obvious from the art of record. In other words this means that the claimed methyl analogue, as well as its use as a fungicide, would have already been in the possession of the public at the time appellants made their invention. The fact that appellants may have discovered a new specific use for that which is already in the possession of the public does not entitle them to a patent thereon. In effect appellants seek to exclude the public from the use of a chemical [**7] compound for any purpose including the use as a fungicide (e.g., as against *Phytophthora infestans*, *Diplocarpon rosae*, *Sphaerotheca panosae*, *Erysiphe cichoracearum*) when said compound and its use are already in the public domain; *Monsanto Company v. Rohm and Haas Company*, *supra* (164 USPQ at 565, 566).

On reconsideration, it added:

We remain of the view that appellants have not established in this record any unobvious properties of the claimed class of compounds as a whole nor have they established any unexpected improvement in properties not possessed by the art compounds.

In response to these rejections, appellants submitted to the Patent and Trademark Office two declarations under Rule 132. The first attempted to establish unexpected properties of the methyl analogue of bis-imidazolyl-bisphenylmethane as compared to the corresponding unsubstituted imidazole. The second was submitted by appellants with their reply brief before the board; it was not considered "since it has not been indicated nor seen to be limited to new points of argument in the Examiner's Answer." No further discussion of these declarations is deemed necessary as neither is relied upon in rendering our [**8] decision.

Opinion

As quoted, *supra*, the board raised the point that appellants' invention (i.e., that which is claimed) is a chemical compound or group of compounds, not the method of using them in treating humans or animals infected with pathogenic fungi. However, this court on numerous occasions has held that a compound and its

properties are inseparable. *In re Albrecht*, 514 F.2d 1389, 185 USPQ 585 (CCPA 1975); *In re Murch*, 59 CCPA 1277, 464 F.2d 1051, 175 USPQ 89 (1972); *In re Stemmiski*, 58 CCPA 1410, 44 F.2d 581, 170 USPQ 343 (1971); *In re Papesch*, 50 CCPA 1084, 315 F.2d 381, 137 USPQ 43 (1963). A finding of unobviousness in consequence depends on comparing the old and new compounds as wholes, inclusive of their properties. *In re Albrecht*, *supra*.

Although the board affirmed the rejection of claims 2 and 6 as being [*1403] obvious in view of (1) Fournari, (2) Fournari in view of Mussell, and (3) Fournari in view of Mussell and Tolkmith, we will restrict our discussion to the last-recited rejection - clearly the Office's strongest position. This assumes that the three cited references are combinable, an assumption that we will make, although not without reservation. [**9] 6

6 As we have stated in the past, there must be some logical reason apparent from positive, concrete evidence of record which justifies a combination of primary and secondary references. *In re Stemmiski*, *supra*. Further, as we stated in *In re Bergel*, 48 CCPA 1102, 1105, 292 F.2d 955, 956, 130 USPQ 206, 208 (1961):

The mere fact that it is possible to find two isolated disclosures which might be combined in such a way to produce a new compound does not necessarily render such production obvious unless the art also contains something to suggest the desirability of the proposed combination.

In the present case, it may reasonably be argued that because Fournari discloses no suggestion of utility for the compounds recited therein, one of ordinary skill in the art would not be prompted to combine this reference with either Mussell or Tolkmith.

Fournari discloses numerous compounds, one of which happens to be bis-imidazolyl-bisphenylmethane. The solicitor characterized this compound as the "parent" of the compounds encompassed by the appealed claims. We read this to imply that when a hindsight selection of possible "R's", "X's", "Y's", "m's" and "n's" is made in appellant's [**10] claims 2 and 6, it can be made to appear that Fournari differs from appellants' claimed compounds by an alkyl group on one of the phenyl radicals. Therefore, we are faced with the question

whether the secondary references, i.e., Mussell and Tolkmith, disclose enough to render obvious that which is missing in Fournari - the missing alkyl substitution.

Mussell only discloses tritylimidazole compounds. Although the patentees do teach unsubstituted and lower alkyl substituted phenyl radicals, the imidazoles disclosed are those possessing a single imidazole group and three phenyl groups. Furthermore, notwithstanding the board's characterization of Mussell's compounds as possessing "fungicidal activity," we find that such activity is limited to the control of fungi found on plants. As stated by Mussell:

It has been discovered that the tritylimidazole compounds are particularly adapted to be employed for the control of a wide range of fungi, especially those fungal organisms ordinarily found on the aerial portions of plants, such as, for example, cherry leaf spot, black spot, apple scab, rice blast, powdery mildew, Helminthosporium (leaf spot on grasses, cereals, and corn), and late [*11] blight. The compounds can also be applied in dormant applications to the woody surfaces of plants or to orchard floor surfaces for the control of the overwintering spores of many fungi. In addition, the tritylimidazole compounds can be applied to seeds to protect the seeds from the attack of fungal organisms such as rot and mildew. Also, the tritylimidazole compounds can be distributed in soil at fungicidal concentrations to control the organisms which attack seeds and plant roots, particularly the fungal organisms of root rot and mildew.

Tolkmith represents a rather complex study, clearly directed towards a theoretician. The results of the study, presented in abstract form, are as follows:

Abstract. Study of several new types of fungitoxic derivatives of imidazole reveals that imidazoles substituted on the imine nitrogen atom are likely to be active if the substituent is electron-attracting, and if the atom connecting it to the imidazolyl moiety has tetrahedral geometry. Fungitoxicity is high with phosphinamidothionate and triarylmethyl groups as substituents. The presence of an asymmetric phosphorus atom in the substituent has no effect on fungitoxicity, but affects mammalian [*12] toxicity.

Both the solicitor and the board rely on Tolkmith for its alleged conclusion that fungicidal activity is primarily due [*1404] to the imidazole moiety. Although we can

find no such verbatim statement in Tolkmith, we surmise that the following language is that which the board had in mind:

[Fungitoxic] action seemed more likely to result from the nucleophilicity of I⁷, that is, from the power of the azole nitrogen of the imidazolyl group to attack an electrophilic site in the fungus organism by donating electrons to this site.

7 Compound I of Tolkmith is as follows:

[Graphic omitted. See illustration in original.]

Our reading of Tolkmith leads us to a different conclusion.

Tolkmith presents four compounds which were studied for fungicidal activity. All four possess imidazole moieties, but only compound II, an unsubstituted tritylimidazole, was "nearly as active" as the reference compound N,N-diethylimidazol-1-yl phenylphosphinamidothionate - two others "were markedly less fungicidal." The only conclusion presented in the Tolkmith article is that imidazoles substituted on the imine nitrogen atom are likely to be active if the substituent is [*13] electron-attracting, and if the atom connecting it to the imidazolyl moiety has tetrahedral geometry.

Last, Tolkmith's disclosed utility for the active compounds studied is that of "foliage fungicides." Compound II, relied upon by the board, is taught by Tolkmith to have "[shown] moderate mammalian toxicity."

When we combine the information gleaned from each reference, we are apprised of the following. First, methanes substituted with one, two or three unsubstituted imidazolyls and one, two or three unsubstituted phenyls are known (Fournari). Second, tritylimidazoles with lower alkyl substitution on the phenyl moieties are known as fungicides for plants (Mussell). Third, imidazoles substituted on the imine nitrogen atom are likely to be active foliage fungicides if the substituent is electron-attracting, and if the atom connecting it to the imidazolyl moiety has tetrahedral geometry (Tolkmith). Fourth, and last, tritylimidazole is an active foliage fungicide that exhibits moderate mammalian toxicity (Tolkmith).

526 F.2d 1399, *1404; 1975 CCPA LEXIS 102, **13;
188 U.S.P.Q. (BNA) 136

We cannot agree with the board that the information derived from the references, taken as a whole, would render obvious claims 2 and 6 which are directed toward [**14] substituted bisimidazolyl-bisphenylmethanes disclosed as being pharmaceutically acceptable and useful as antimycotics especially against dermatomycosis

caused by Trichophyton and Microsporium species and also against yeast infections of the skin and internal organs. Accordingly, the decision of the board is reversed.

REVERSED

LEXSEE 149 F.3D 1350

IN RE DENIS ROUFFET, YANNICK TANGUY and FREDERIC BERTHAULT

97-1492

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

149 F.3d 1350; 1998 U.S. App. LEXIS 16414; 47 U.S.P.Q.2D (BNA) 1453

July 15, 1998, Decided

PRIOR HISTORY: [**1] Appealed from: Patent and Trademark Office Board of Patent Appeals and Interferences. (Serial No. 07/888,791).

DISPOSITION: REVERSED.

COUNSEL: Richard C. Turner and Grant K. Rowan, Sughrue, Mion, Zinn, Macpeak & Seas, PLLC, of Washington, DC, argued for appellants.

David J. Ball, Jr., Associate Solicitor, Office of the Solicitor, Patent and Trademark Office, of Arlington, Virginia, argued for appellee. With him on the brief were Nancy J. Linck, Solicitor, Albin F. Drost, Deputy Solicitor, and Craig R. Kaufman, Associate Solicitor. Of counsel was Scott A. Chambers, Associate Solicitor, Office of the Solicitor.

JUDGES: Before PLAGER, Circuit Judge, ARCHER, Senior Circuit Judge, and RADER, Circuit Judge.

OPINION BY: RADER

OPINION

[*1352] RADER, Circuit Judge.

Denis Rouffet, Yannick Tanguy, and Frederic Berthault (collectively, Rouffet) submitted application 07/888,791 (the application) on May 27, 1992. The Board of Patent Appeals and Interferences (the Board) affirmed final rejection of the application as obvious under 35 U.S.C. § 103(a). See *Ex parte Rouffet*, No. 96-1553 (Bd. Pat. App. & Int. Apr. 16, 1997). Because the Board reversibly erred in identifying a motivation to combine the references, this [**2] court reverses.

I.

Satellites in a geosynchronous or geostationary orbit remain over the same point on the Earth's surface. Their constant position above the Earth's surface facilitates communications. These satellites project a number of beams to the Earth. Each beam transmits to its area of coverage, or footprint, on the Earth's surface. In order to provide complete coverage, adjacent footprints overlap slightly and therefore must use different frequencies to avoid interference. However, two or more non-overlapping footprints can use the same set of frequencies in order to use efficiently the limited radio spectrum. Figure 1 from the application shows the coverage of a portion of the Earth's surface provided by multiple cone shaped beams:

[*1353] [SEE FIGURE 1 IN ORIGINAL]

Frequency reuse techniques, however, have a limited ability to compensate for congestion in geostationary orbits. To alleviate the orbit congestion problem, new telecommunications systems use a network of satellites in low Earth orbit. When viewed from a fixed point on the Earth's surface, such satellites do not remain stationary but move overhead. A satellite's motion as it transmits a plurality of cone-shaped beams [**3] creates a new problem. The satellite's movement causes a receiver on the Earth's surface to move from the footprint of one beam into a second beam transmitted by the same satellite. Eventually, the satellite's motion causes the receiver to move from the footprint of a beam transmitted by one satellite into the footprint of a beam transmitted by a second satellite. Each switch from one footprint to another creates a "handover" event analogous to that which occurs when a traditional cellular phone travels from one cell to another. Handovers are undesirable

because they can cause interruptions in signal transmission and reception.

Rouffet's application discloses technology to reduce the number of handovers between beams transmitted by the same satellite. In particular, Rouffet eliminates handovers caused solely by the satellite's motion. To accomplish this goal, Rouffet changes the shape of the beam transmitted by the satellite's antenna. Rouffet's satellites transmit fan-shaped beams. A fan beam has an elliptical footprint. Rouffet aligns the long axis of his beams parallel to the direction of the satellite's motion across the Earth's surface. By elongating the beam's footprint in the [*4] direction of satellite travel, Rouffet's invention ensures that a fixed point on the Earth's surface likely will remain within a single footprint until it is necessary to switch to another satellite. Because Rouffet's invention does not address handovers caused by the motion of the receiver across the Earth's [*1354] surface, his arrangement reduces, but does not eliminate, handovers. Figure 3 from the application shows the footprints 12 from six beams aligned in the direction of satellite motion 15:

[SEE FIGURE 3 IN ORIGINAL]

The application contains ten claims that stand or fall as a group. Claim 1 is representative:

A low orbit satellite communications system for mobile terminals, wherein the communications antenna system of each satellite provides isoflux coverage made up of a plurality of fan beams that are elongate in the travel direction of the satellite.

The examiner initially rejected Rouffet's claims as unpatentable over U.S. Pat. No. 5,199,672 (King) in view of U.S. Pat. No. 4,872,015 (Rosen) and a conference report entitled "A Novel Non-Geostationary Satellite Communications System," Conference Record, International Conference on Communications, [*5] 1981 (Ruddy). On appeal to the Board, the examiner added an alternative ground for rejection, holding that the claims were obvious over U.S. Pat. No. 5,394,561 (Freeburg) in view of U.S. Pat. No. 5,170,485 (Levine).

On April 16, 1997, the Board issued its decision. Because Rouffet had specified that the claims would

stand or fall as a group based on the patentability of claim 1, the Board limited its opinion to that claim. The Board unanimously determined that the examiner had properly rejected claim 1 as obvious over King in view of Rosen and Ruddy. The Board, on a split vote, also affirmed the rejection over Freeburg in view of Levine.

[*1355] II

To reject claims in an application under section 103, an examiner must show an un rebutted *prima facie* case of obviousness. See *In re Deuel*, 51 F.3d 1552, 1557, 34 U.S.P.Q.2D (BNA) 1210, 1214 (Fed. Cir. 1995). In the absence of a proper *prima facie* case of obviousness, an applicant who complies with the other statutory requirements is entitled to a patent. See *In re Oetiker*, 977 F.2d 1443, 1445, 24 U.S.P.Q.2D (BNA) 1443, 1444 (Fed. Cir. 1992). On appeal to the Board, an applicant can overcome a rejection by showing insufficient evidence of *prima* [*6] *facie* obviousness or by rebutting the *prima facie* case with evidence of secondary indicia of nonobviousness. See id.

While this court reviews the Board's determination in light of the entire record, an applicant may specifically challenge an obviousness rejection by showing that the Board reached an incorrect conclusion of obviousness or that the Board based its obviousness determination on incorrect factual predicates. This court reviews the ultimate determination of obviousness as a question of law. See *In re Lueders*, 111 F.3d 1569, 1571, 42 U.S.P.Q.2D (BNA) 1481, 1482 (Fed. Cir. 1997). The factual predicates underlying an obviousness determination include the scope and content of the prior art, the differences between the prior art and the claimed invention, and the level of ordinary skill in the art. See *Monarch Knitting Mach. Corp. v. Sulzer Morat GmbH*, 139 F.3d 877, 881, 45 U.S.P.Q.2D (BNA) 1977, 1981 (Fed. Cir. 1998). This court reviews the Board's factual findings for clear error. See *In re Zurko*, 142 F.3d 1447, 1449, 46 U.S.P.Q.2D (BNA) 1691, 1693 (Fed. Cir. 1998) (in banc); *Lueders*, 111 F.3d at 1571-72. "A finding is clearly erroneous when, although there is evidence to support [*7] it, the reviewing court on the entire evidence is left with the definite and firm conviction that a mistake has been committed." *In re Graves*, 69 F.3d 1147, 1151, 36 U.S.P.Q.2D (BNA) 1697, 1700 (Fed. Cir. 1995) (quoting *United States v. United States Gypsum Co.*, 333 U.S. 364, 395, 92 L. Ed. 746, 68 S. Ct. 525 (1948)).

149 F.3d 1350, *1355; 1998 U.S. App. LEXIS 16414, **7;
47 U.S.P.Q.2D (BNA) 1453

The secondary considerations are also essential components of the obviousness determination. See *In re Emert*, 124 F.3d 1458, 1462, 44 U.S.P.Q.2D (BNA) 1149, 1153 (Fed. Cir. 1997) ("Without Emert providing rebuttal evidence, this *prima facie* case of obviousness must stand."). This objective evidence of nonobviousness includes copying, long felt but unsolved need, failure of others, see *Graham v. John Deere Co.*, 383 U.S. 1, 17-18, 15 L. Ed. 2d 545, 86 S. Ct. 684 (1966), commercial success, see *In re Huang*, 100 F.3d 135, 139-40, 40 U.S.P.Q.2D (BNA) 1685, 1689-90 (Fed. Cir. 1996), unexpected results created by the claimed invention, unexpected properties of the claimed invention, see *In re Mayne*, 104 F.3d 1339, 1342, 41 U.S.P.Q.2D (BNA) 1451, 1454 (Fed. Cir. 1997); *In re Woodruff*, 919 F.2d 1575, 1578, 16 U.S.P.Q.2D (BNA) 1934, 1936-37 (Fed. Cir. 1990), licenses showing industry respect for [*88] the invention, see *Arkie Lures, Inc. v. Gene Larew Tackle, Inc.*, 119 F.3d 953, 957, 43 U.S.P.Q.2D (BNA) 1294, 1297 (Fed. Cir. 1997); *Pentec, Inc. v. Graphic Controls Corp.*, 776 F.2d 309, 316, 227 U.S.P.Q. (BNA) 766, 771 (Fed. Cir. 1985), and skepticism of skilled artisans before the invention, see *In re Dow Chem. Co.*, 837 F.2d 469, 473, 5 U.S.P.Q.2D (BNA) 1529, 1532 (Fed. Cir. 1988). The Board must consider all of the applicant's evidence. See *Oetiker*, 977 F.2d at 1445 ("An observation by the Board that the examiner made a *prima facie* case is not improper, as long as the ultimate determination of patentability is made on the entire record."); *In re Piasecki*, 745 F.2d 1468, 1472, 223 U.S.P.Q. (BNA) 785, 788 (Fed. Cir. 1984). The court reviews factual conclusions drawn from this evidence for clear error. Whether the evidence presented suffices to rebut the *prima facie* case is part of the ultimate conclusion of obviousness and is therefore a question of law.

When a rejection depends on a combination of prior art references, there must be some teaching, suggestion, or motivation to combine the references. See *In re Geiger*, 815 F.2d 686, 688, 2 U.S.P.Q.2D (BNA) 1276, 1278 (Fed. Cir. 1987). Although the [*99] suggestion to combine references may flow from the nature of the problem, see *Pro-Mold & Tool Co. v. Great Lakes Plastics, Inc.*, 75 F.3d 1568, 1573, 37 U.S.P.Q.2D (BNA) 1626, 1630 (Fed. Cir. 1996), the suggestion more often comes from the teachings of the pertinent references, see *In re Semaker*, 702 F.2d 989, 994, 217 U.S.P.Q. (BNA) 1, 5 (Fed. Cir. 1983), or from the ordinary knowledge of those skilled in the art that certain references are of

special importance [*1356] in a particular field, see *Pro-Mold*, 75 F.3d at 1573 (citing *Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*, 776 F.2d 281, 297 n.24, 227 U.S.P.Q. (BNA) 657, 667 n.24 (Fed. Cir. 1985)). Therefore, "when determining the patentability of a claimed invention which combines two known elements, 'the question is whether there is something in the prior art as a whole to suggest the desirability, and thus the obviousness, of making the combination.'" See *In re Beattie*, 974 F.2d 1309, 1311-12, 24 U.S.P.Q.2D (BNA) 1040, 1042 (Fed. Cir. 1992) (quoting *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 1462, 221 U.S.P.Q. (BNA) 481, 488 (Fed. Cir. 1984)).

III

The parties agree that the five references asserted by the examiner [*910] are in the same field of endeavor as the invention. The parties also agree that the pertinent level of skill in the art - design of satellite communications systems - is high. On appeal, Rouffet asserts that the examiner and the Board erred by improperly combining references to render the claimed invention obvious.

The Combination of King, Rosen, and Ruddy

The Board first affirmed the rejection of Rouffet's claims over a combination of King, Rosen, and Ruddy. King discloses a system for launching a plurality of satellites into low Earth orbits from a single launch vehicle. Rosen teaches a geostationary satellite that uses a plurality of fan beams with their long axes oriented in an east-west direction to communicate with mobile and fixed terminals on the Earth.

The final, and most important, reference in this combination is Ruddy. Ruddy describes a television broadcast system that uses a series of satellites to retransmit signals sent from a ground station over a wide area. Rather than using a geostationary orbit, Ruddy teaches the use of a series of satellites in Molniya orbits. A satellite in a Molniya orbit always follows the same path through the sky when viewed from a fixed [*11] point on the ground. Viewed from the Earth, the orbital path includes a narrow, elliptical apogee loop. In order to transmit to these moving satellites from a ground station, Ruddy uses a fan beam with a long axis aligned with the long axis of the orbit's apogee loop. This alignment places the entire apogee loop within the footprint of the

beam and eliminates the need for the ground station's antenna to track the satellite's motion around the apogee loop. Ruddy further teaches orbit parameters and spacing of multiple satellites to ensure that a satellite is always in the loop to receive and rebroadcast signals from the Earth station.

King and Rosen together teach the use of a network of satellites in low Earth orbit. Thus, Ruddy becomes the piece of the prior art mosaic that shows, in the reading of the Board, the use of "a plurality of fan beams that are elongate in the travel direction of the satellite." Ruddy, however, is different from the claimed invention in several respects. Specifically, the application claims the projection of multiple elliptical fan-shaped footprints from the satellite to the ground. See Claim 1, *supra*, see also Application at 6, lines 9-11 ("In [*12] addition, in this system, the geometrical shape of the beams 12 is changed: instead of being circular they are now elongate ellipses."). The application's written description further teaches that the invention's fan-shaped satellite beams will minimize handovers. See *id.* at lines 11-16 ("This considerably increases call durations between handovers.").

In contrast, Ruddy teaches that a ground station may use a single fan-shaped beam to transmit to a satellite in a unique Molniya orbit. The ground station transmits a beam into which a series of satellites in Molniya orbits will successively enter. At least two differences are evident: the application teaches projection of multiple beams from a satellite to the Earth, while Ruddy teaches projection of a single beam from the Earth to satellites. Moreover to the extent Ruddy contains a teaching about handovers, its teachings focus on use of the unique Molniya orbit to ensure that a satellite always falls within the beam transmitted by the ground station.

These differences suggest some difficulty in showing a *prima facie* case of obviousness. The Board, however, specifically found that artisans of ordinary skill in this field of [*13] art would know to shift the frame of reference from a ground station following a satellite to a satellite transmitting to the ground. According proper deference to the Board's finding [*1357] of a lofty skill level for ordinary artisans in this field, this court discerns no clear error in the Board's conclusion that these differences would not preclude a finding of obviousness. While Ruddy does not expressly teach alignment of the fan beam with the apparent direction of the satellite's

motion, this court perceives no clear error in the Board's determination that Ruddy would suggest such an alignment to one of skill in this art. Therefore, the Board did not err in finding that the combination of King, Rosen, and Ruddy contains all of the elements claimed in Rouffet's application.

However, the Board reversibly erred in determining that one of skill in the art would have been motivated to combine these references in a manner that rendered the claimed invention obvious. Indeed, the Board did not identify any motivation to choose these references for combination. Ruddy does not specifically address handover minimization. To the extent that Ruddy at all addresses handovers due to satellite motion, [*14] it addresses this subject through the selection of orbital parameters. Ruddy does not teach the choice of a particular shape and alignment of the beam projected by the satellite. Thus Ruddy addresses the handover problem with an orbit selection, not a beam shape. The Board provides no reasons that one of ordinary skill in this art, seeking to minimize handovers due to satellite motion, would combine Ruddy with Rosen and King in a manner that would render the claimed invention obvious.

Obviousness is determined from the vantage point of a hypothetical person having ordinary skill in the art to which the patent pertains. See 35 U.S.C. § 103(a). This legal construct is akin to the "reasonable person" used as a reference in negligence determinations. The legal construct also presumes that all prior art references in the field of the invention are available to this hypothetical skilled artisan. See *In re Carlson*, 983 F.2d 1032, 1038, 25 U.S.P.Q.2D (BNA) 1207, 1211 (Fed. Cir. 1993).

As this court has stated, "virtually all [inventions] are combinations of old elements." *Environmental Designs, Ltd. v. Union Oil Co.*, 713 F.2d 693, 698, 218 U.S.P.Q. (BNA) 865, 870 (Fed. Cir. 1983); see also [*15] *Richdel, Inc. v. Sunspool Corp.*, 714 F.2d 1573, 1579-80, 219 U.S.P.Q. (BNA) 8, 12 (Fed. Cir. 1983) ("Most, if not all, inventions are combinations and mostly of old elements."). Therefore an examiner may often find every element of a claimed invention in the prior art. If identification of each claimed element in the prior art were sufficient to negate patentability, very few patents would ever issue. Furthermore, rejecting patents solely by finding prior art corollaries for the claimed elements would permit an examiner to use the claimed invention itself as a blueprint for piecing together elements in the

prior art to defeat the patentability of the claimed invention. Such an approach would be "an illogical and inappropriate process by which to determine patentability." *Sensonics, Inc. v. Aerosonic Corp.*, 81 F.3d 1566, 1570, 38 U.S.P.Q.2D (BNA) 1551, 1554 (Fed. Cir. 1996).

To prevent the use of hindsight based on the invention to defeat patentability of the invention, this court requires the examiner to show a motivation to combine the references that create the case of obviousness. In other words, the examiner must show reasons that the skilled artisan, confronted with the same problems as the [*16] inventor and with no knowledge of the claimed invention, would select the elements from the cited prior art references for combination in the manner claimed.

This court has identified three possible sources for a motivation to combine references: the nature of the problem to be solved, the teachings of the prior art, and the knowledge of persons of ordinary skill in the art. In this case, the Board relied upon none of these. Rather, just as it relied on the high level of skill in the art to overcome the differences between the claimed invention and the selected elements in the references, it relied upon the high level of skill in the art to provide the necessary motivation. The Board did not, however, explain what specific understanding or technological principle within the knowledge of one of ordinary skill in the art would have suggested the combination. Instead, the Board merely invoked the high level of skill in the field of art. If such a rote invocation could suffice to supply a motivation to combine, the more sophisticated scientific fields would rarely, if ever, experience a patentable technical advance. Instead, in complex scientific fields, the Board could routinely identify [*17] the prior art elements in an application, invoke the lofty level of skill, and rest its case for rejection. To counter this potential weakness in the obviousness [*1358] construct, the suggestion to combine requirement stands as a critical safeguard against hindsight analysis and rote application of the legal test for obviousness.

Because the Board did not explain the specific understanding or principle within the knowledge of a skilled artisan that would motivate one with no knowledge of Rouffet's invention to make the combination, this court infers that the examiner selected these references with the assistance of hindsight. This

court forbids the use of hindsight in the selection of references that comprise the case of obviousness. See *In re Gorman*, 933 F.2d 982, 986, 18 U.S.P.Q.2D (BNA) 1885, 1888 (Fed. Cir. 1991). Lacking a motivation to combine references, the Board did not show a proper *prima facie* case of obviousness. This court reverses the rejection over the combination of King, Rosen, and Ruddy.

The Combination of Freeburg and Levine

Freeburg teaches a cellular radiotelephone system based on a constellation of low Earth orbit satellites that use conical beams to transmit from [*18] the satellite to both fixed and mobile Earth stations. Levine teaches an Earth-based cellular radio system that uses fan beams broadcast from antenna towers. Levine's elliptical footprints are aligned with the road grid. To increase the capacity of traditional ground-based systems through frequency reuse techniques, Levine teaches the use of antennas that broadcast signals with smaller footprints than the prior art system. Thus, Levine actually increases the number of overlap regions between cells and, hence, the number of potential handovers. Figure 1 of the Levine patent illustrates its alignment of beam footprints:

[SEE FIGURE 1 IN ORIGINAL]

[*1359] As a mobile unit (e.g., a driver using a car phone) moves through a succession of overlapping zones, Levine uses selection algorithms to determine which of the cells is aligned with the travel direction of the mobile unit. These algorithms then select this cell for use while continually monitoring intersecting cells in the event that the mobile unit changes direction.

Once again, this court notes significant differences between the teachings of the application and the Levine-Freeburg combination. The critical Levine reference again involves [*19] a beam from an Earth station without any reference to the "travel direction of [a] satellite." Moreover, Levine actually multiplies the number of potential handovers and then uses software to sort out the necessary handovers from the unnecessary. However, the Board explains the reasons that one possessing the lofty skills characteristic of this field would know to account for the differences between the claimed invention and the prior art combination. This court discerns no clear error in that reliance on the considerable skills in this field.

This court does, however, discern reversible error in the Board's identification of a motivation to combine Levine and Freeburg. In determining that one of skill in the art would have had motivation to combine Levine and Freeburg, the Board noted that "the level of skill in the art is very high." As noted before, this observation alone cannot supply the required suggestion to combine these references. The Board posits that the high level of skill in the art overcomes the absence of any actual suggestion that one could select part of the teachings of Levine for combination with the satellite system disclosed by Freeburg.

As noted above, the [**20] suggestion to combine requirement is a safeguard against the use of hindsight combinations to negate patentability. While the skill level is a component of the inquiry for a suggestion to combine, a lofty level of skill alone does not suffice to supply a motivation to combine. Otherwise a high level of ordinary skill in an art field would almost always preclude patentable inventions. As this court has often noted, invention itself is the process of combining prior art in a nonobvious manner. See, e.g., *Richdel*, 714 F.2d at 1579; *Environmental Designs*, 713 F.2d at 698. Therefore, even when the level of skill in the art is high, the Board must identify specifically the principle, known to one of ordinary skill, that suggests the claimed combination. Cf. *Gechter v. Davidson*, 116 F.3d 1454, 43 U.S.P.Q.2D (BNA) 1030 (Fed. Cir. 1997) (explaining that the Board's opinion must describe the basis for its decision). In other words, the Board must explain the

reasons one of ordinary skill in the art would have been motivated to select the references and to combine them to render the claimed invention obvious.

The Board's naked invocation of skill in the art to supply a suggestion to combine [**21] the references cited in this case is therefore clearly erroneous. Absent any proper motivation to combine part of Levine's teachings with Freeburg's satellite system, the rejection of Rouffet's claim over these references was improper and is reversed.

IV

The Board reversibly erred in determining that there was a motivation to combine either the teachings of King, Rosen, and Ruddy or of Freeburg and Levine in a manner that would render the claimed invention obvious. Because this predicate was missing in each case, the Board did not properly show that these references render the claimed invention obvious. Therefore this court reverses the Board's decision upholding the rejection of Rouffet's claims. In light of this disposition, Rouffet's pending motion to remand the case to the Board for further consideration is denied as moot.

COSTS

Each party shall bear its own costs.

REVERSED.

LEXSEE 127 S. CT. 1727

KSR INTERNATIONAL CO., PETITIONER v. TELEFLEX INC. ET AL.**No. 04-1350****SUPREME COURT OF THE UNITED STATES**

127 S. Ct. 1727; 167 L. Ed. 2d 705; 2007 U.S. LEXIS 4745; 75 U.S.L.W. 4289; 82 U.S.P.Q.2D (BNA) 1385; 20 Fla. L. Weekly Fed. S 248

November 28, 2006, Argued
April 30, 2007, Decided

NOTICE:

[***1] The LEXIS pagination of this document is subject to change pending release of the final published version.

SUBSEQUENT HISTORY: On remand at *Teleflex, Inc. v. KSR Int'l Co.*, 2007 U.S. App. LEXIS 16051 (*Fed. Cir.*, June 20, 2007)

PRIOR HISTORY: ON WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT.

Teleflex, Inc. v. KSR Int'l Co., 119 Fed. Appx. 282, 2005 U.S. App. LEXIS 176 (*Fed. Cir.*, 2005)

DISPOSITION: Reversed and remanded.

SYLLABUS

To control a conventional automobile's speed, the driver depresses or releases the gas pedal, which interacts with the throttle via a cable or other mechanical link. Because the pedal's position in the footwell normally cannot be adjusted, a driver wishing to be closer or farther from it must either reposition himself in the seat or move the seat, both of which can be imperfect solutions for smaller drivers in cars with deep footwells. This prompted inventors to design and patent pedals that could be adjusted to change their locations. The Asano patent reveals a support structure whereby, when the pedal location is [***2] adjusted, one of the pedal's pivot points stays fixed. Asano is also designed so that the force necessary to depress the pedal is the same regardless of location adjustments. The Redding patent

reveals a different, sliding mechanism where both the pedal and the pivot point are adjusted.

In newer cars, computer-controlled throttles do not operate through force transferred from the pedal by a mechanical link, but open and close valves in response to electronic signals. For the computer to know what is happening with the pedal, an electronic sensor must translate the mechanical operation into digital data. Inventors had obtained a number of patents for such sensors. The so-called '936 patent taught that it was preferable to detect the pedal's position in the pedal mechanism, not in the engine, so the patent disclosed a pedal with an electronic sensor on a pivot point in the pedal assembly. The Smith patent taught that to prevent the wires connecting the sensor to the computer from chafing and wearing out, the sensor should be put on a fixed part of the pedal assembly rather than in or on the pedal's footpad. Inventors had also patented self-contained modular sensors, which can be [***3] taken off the shelf and attached to any mechanical pedal to allow it to function with a computer-controlled throttle. The '068 patent disclosed one such sensor. Chevrolet also manufactured trucks using modular sensors attached to the pedal support bracket, adjacent to the pedal and engaged with the pivot shaft about which the pedal rotates. Other patents disclose electronic sensors attached to adjustable pedal assemblies. For example, the Rixon patent locates the sensor in the pedal footpad, but is known for wire chafing.

After petitioner KSR developed an adjustable pedal system for cars with cable-actuated throttles and obtained its '976 patent for the design, General Motors Corporation (GMC) chose KSR to supply adjustable pedal systems for trucks using computer-controlled

throttles. To make the '976 pedal compatible with the trucks, KSR added a modular sensor to its design. Respondents (Teleflex) hold the exclusive license for the Engelgau patent, claim 4 of which discloses a position-adjustable pedal assembly with an electronic pedal position sensor attached a fixed pivot point. Despite having denied a similar, broader claim, the U.S. Patent and Trademark Office (PTO) had allowed [***4] claim 4 because it included the limitation of a fixed pivot position, which distinguished the design from Redding's. Asano was neither included among the Engelgau patent's prior art references nor mentioned in the patent's prosecution, and the PTO did not have before it an adjustable pedal with a fixed pivot point. After learning of KSR's design for GMC, Teleflex sued for infringement, asserting that KSR's pedal system infringed the Engelgau patent's claim 4. KSR countered that claim 4 was invalid under § 103 of the Patent Act, which forbids issuance of a patent when "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art."

Graham v. John Deere Co. of Kansas City, 383 U.S. 1, 17-18, 86 S. Ct. 684, 15 L. Ed. 2d 545, set out an objective analysis for applying § 103: "The scope and content of the prior art are . . . determined; differences between the prior art and the claims at issue are . . . ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background the obviousness or nonobviousness [***5] of the subject matter is determined. Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented." While the sequence of these questions might be reordered in any particular case, the factors define the controlling inquiry. However, seeking to resolve the obviousness question with more uniformity and consistency, the Federal Circuit has employed a "teaching, suggestion, or motivation" (TSM) test, under which a patent claim is only proved obvious if the prior art, the problem's nature, or the knowledge of a person having ordinary skill in the art reveals some motivation or suggestion to combine the prior art teachings.

The District Court granted KSR summary judgment. After reviewing pedal design history, the Engelgau

patent's scope, and the relevant prior art, the court considered claim 4's validity, applying *Graham's* framework to determine whether under summary-judgment standards KSR had demonstrated that claim 4 was obvious. The court found "little difference" between the prior art's teachings and claim 4: [***6] Asano taught everything contained in the claim except using a sensor to detect the pedal's position and transmit it to a computer controlling the throttle. That additional aspect was revealed in, e.g., the '068 patent and Chevrolet's sensors. The court then held that KSR satisfied the TSM test, reasoning (1) the state of the industry would lead inevitably to combinations of electronic sensors and adjustable pedals, (2) Rixon provided the basis for these developments, and (3) Smith taught a solution to Rixon's chafing problems by positioning the sensor on the pedal's fixed structure, which could lead to the combination of a pedal like Asano with a pedal position sensor.

Reversing, the Federal Circuit ruled the District Court had not applied the TSM test strictly enough, having failed to make findings as to the specific understanding or principle within a skilled artisan's knowledge that would have motivated one with no knowledge of the invention to attach an electronic control to the Asano assembly's support bracket. The Court of Appeals held that the District Court's recourse to the nature of the problem to be solved was insufficient because, unless the prior art references [***7] addressed the precise problem that the patentee was trying to solve, the problem would not motivate an inventor to look at those references. The appeals court found that the Asano pedal was designed to ensure that the force required to depress the pedal is the same no matter how the pedal is adjusted, whereas Engelgau sought to provide a simpler, smaller, cheaper adjustable electronic pedal. The Rixon pedal, said the court, suffered from chafing but was not designed to solve that problem and taught nothing helpful to Engelgau's purpose. Smith, in turn, did not relate to adjustable pedals and did not necessarily go to the issue of motivation to attach the electronic control on the pedal assembly's support bracket. So interpreted, the court held, the patents would not have led a person of ordinary skill to put a sensor on an Asano-like pedal. That it might have been obvious to try that combination was likewise irrelevant. Finally, the court held that genuine issues of material fact precluded summary judgment.

Held: The Federal Circuit addressed the obviousness

question in a narrow, rigid manner that is inconsistent with § 103 and this Court's precedents. KSR provided convincing [***8] evidence that mounting an available sensor on a fixed pivot point of the Asano pedal was a design step well within the grasp of a person of ordinary skill in the relevant art and that the benefit of doing so would be obvious. Its arguments, and the record, demonstrate that the Engelgau patent's claim 4 is obvious. Pp. 11-24.

1. *Graham* provided an expansive and flexible approach to the obviousness question that is inconsistent with the way the Federal Circuit applied its TSM test here. Neither § 103's enactment nor *Graham's* analysis disturbed the Court's earlier instructions concerning the need for caution in granting a patent based on the combination of elements found in the prior art. See *Great Atlantic & Pacific Tea Co. v. Supermarket Equipment Corp.*, 340 U.S. 147, 152, 71 S. Ct. 127, 95 L. Ed. 162, 1951 Dec. Comm'r Pat. 572. Such a combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results. See, e.g., *United States v. Adams*, 383 U.S. 39, 50-52, 86 S. Ct. 708, 15 L. Ed. 2d 572, 174 Ct. Cl. 1293. When a work is available in one field, design incentives and other market forces can prompt variations of it, either in the same field or in another. If a person [***9] of ordinary skill in the art can implement a predictable variation, and would see the benefit of doing so, § 103 likely bars its patentability. Moreover, if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond that person's skill. A court must ask whether the improvement is more than the predictable use of prior-art elements according to their established functions. Following these principles may be difficult if the claimed subject matter involves more than the simple substitution of one known element for another or the mere application of a known technique to a piece of prior art ready for the improvement. To determine whether there was an apparent reason to combine the known elements in the way a patent claims, it will often be necessary to look to interrelated teachings of multiple patents; to the effects of demands known to the design community or present in the marketplace; and to the background knowledge possessed by a person having ordinary skill in the art. To facilitate review, this analysis should [***10] be made explicit. But it need not seek out precise teachings

directed to the challenged claim's specific subject matter, for a court can consider the inferences and creative steps a person of ordinary skill in the art would employ. Pp. 11-14.

(b) The TSM test captures a helpful insight: A patent composed of several elements is not proved obvious merely by demonstrating that each element was, independently, known in the prior art. Although common sense directs caution as to a patent application claiming as innovation the combination of two known devices according to their established functions, it can be important to identify a reason that would have prompted a person of ordinary skill in the art to combine the elements as the new invention does. Inventions usually rely upon building blocks long since uncovered, and claimed discoveries almost necessarily will be combinations of what, in some sense, is already known. Helpful insights, however, need not become rigid and mandatory formulas. If it is so applied, the TSM test is incompatible with this Court's precedents. The diversity of inventive pursuits and of modern technology counsels against confining the obviousness analysis [***11] by a formalistic conception of the words teaching, suggestion, and motivation, or by overemphasizing the importance of published articles and the explicit content of issued patents. In many fields there may be little discussion of obvious techniques or combinations, and market demand, rather than scientific literature, may often drive design trends. Granting patent protection to advances that would occur in the ordinary course without real innovation retards progress and may, for patents combining previously known elements, deprive prior inventions of their value or utility. Since the TSM test was devised, the Federal Circuit doubtless has applied it in accord with these principles in many cases. There is no necessary inconsistency between the test and the *Graham* analysis. But a court errs where, as here, it transforms general principle into a rigid rule limiting the obviousness inquiry. Pp. 14-15.

(c) The flaws in the Federal Circuit's analysis relate mostly to its narrow conception of the obviousness inquiry consequent in its application of the TSM test. The Circuit first erred in holding that courts and patent examiners should look only to the problem the patentee was trying [***12] to solve. Under the correct analysis, any need or problem known in the field and addressed by the patent can provide a reason for combining the elements in the manner claimed. Second, the appeals

court erred in assuming that a person of ordinary skill in the art attempting to solve a problem will be led only to those prior art elements designed to solve the same problem. The court wrongly concluded that because Asano's primary purpose was solving the constant ratio problem, an inventor considering how to put a sensor on an adjustable pedal would have no reason to consider putting it on the Asano pedal. It is common sense that familiar items may have obvious uses beyond their primary purposes, and a person of ordinary skill often will be able to fit the teachings of multiple patents together like pieces of a puzzle. Regardless of Asano's primary purpose, it provided an obvious example of an adjustable pedal with a fixed pivot point, and the prior art was replete with patents indicating that such a point was an ideal mount for a sensor. Third, the court erred in concluding that a patent claim cannot be proved obvious merely by showing that the combination of elements was obvious to try. [***13] When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill in the art has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense. Finally, the court drew the wrong conclusion from the risk of courts and patent examiners falling prey to hindsight bias. Rigid preventative rules that deny recourse to common sense are neither necessary under, nor consistent with, this Court's case law. Pp. 15-18.

2. Application of the foregoing standards demonstrates that claim 4 is obvious. Pp. 18-23.

(a) The Court rejects Teleflex's argument that the Asano pivot mechanism's design prevents its combination with a sensor in the manner claim 4 describes. This argument was not raised before the District Court, and it is unclear whether it was raised before the Federal Circuit. Given the significance of the District Court's finding that combining Asano with a pivot-mounted pedal position sensor fell within claim 4's scope, it is apparent that Teleflex would [***14] have made clearer challenges if it intended to preserve this claim. Its failure to clearly raise the argument, and the appeals court's silence on the issue, lead this Court to accept the District Court's conclusion. Pp. 18-20.

(b) The District Court correctly concluded that when Engलगau designed the claim 4 subject matter, it was

obvious to a person of ordinary skill in the art to combine Asano with a pivot-mounted pedal position sensor. There then was a marketplace creating a strong incentive to convert mechanical pedals to electronic pedals, and the prior art taught a number of methods for doing so. The Federal Circuit considered the issue too narrowly by, in effect, asking whether a pedal designer writing on a blank slate would have chosen both Asano and a modular sensor similar to the ones used in the Chevrolet trucks and disclosed in the '068 patent. The proper question was whether a pedal designer of ordinary skill in the art, facing the wide range of needs created by developments in the field, would have seen an obvious benefit to upgrading Asano with a sensor. For such a designer starting with Asano, the question was where to attach the sensor. The '936 patent taught [***15] the utility of putting the sensor on the pedal device. Smith, in turn, explained not to put the sensor on the pedal footpad, but instead on the structure. And from Rixon's known wire-chafing problems, and Smith's teaching that the pedal assemblies must not precipitate any motion in the connecting wires, the designer would know to place the sensor on a nonmoving part of the pedal structure. The most obvious such point is a pivot point. The designer, accordingly, would follow Smith in mounting the sensor there. Just as it was possible to begin with the objective to upgrade Asano to work with a computer-controlled throttle, so too was it possible to take an adjustable electronic pedal like Rixon and seek an improvement that would avoid the wire-chafing problem. Teleflex has not shown anything in the prior art that taught away from the use of Asano, nor any secondary factors to dislodge the determination that claim 4 is obvious. Pp. 20-23.

3. The Court disagrees with the Federal Circuit's holding that genuine issues of material fact precluded summary judgment. The ultimate judgment of obviousness is a legal determination. *Graham*, 383 U.S., at 17, 86 S. Ct. 684, 15 L. Ed. 2d 545. Where, as here, the [***16] prior art's content, the patent claim's scope, and the level of ordinary skill in the art are not in material dispute and the claim's obviousness is apparent, summary judgment is appropriate. P. 23.

119 Fed. Appx. 282, reversed and remanded.

COUNSEL: James W. Dabney argued the case for petitioner.

Thomas G. Hungar argued the case for the United

States, as amicus curiae, by special leave of court.

Thomas C. Goldstein

JUDGES: KENNEDY, J., delivered the opinion for a unanimous Court.

OPINION BY: KENNEDY

OPINION

[**714] [*1734] JUSTICE KENNEDY delivered the opinion of the Court.

Teleflex Incorporated and its subsidiary Technology Holding Company -- both referred to here as Teleflex -- sued KSR International Company for patent infringement. The patent at issue, *United States Patent No. 6,237,565* B1, is entitled "Adjustable Pedal Assembly With Electronic Throttle Control." Supplemental App. 1. The patentee is Steven J. Engelgau, and the patent is referred to as "the Engelgau patent." Teleflex holds the exclusive license to the patent.

Claim 4 of the Engelgau patent describes a mechanism for combining an electronic sensor with an adjustable automobile pedal so the pedal's position can be transmitted to a computer that controls the throttle in the vehicle's engine. When Teleflex accused KSR of infringing the Engelgau patent by adding an electronic sensor to one of KSR's previously [***17] designed pedals, KSR countered that claim 4 was invalid under the Patent Act, 35 U.S.C. § 103, because its subject matter was obvious.

Section 103 forbids issuance of a patent when "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having [**715] ordinary skill in the art to which said subject matter pertains."

In *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 86 S. Ct. 684, 15 L. Ed. 2d 545 (1966), the Court set out a framework for applying the statutory language of § 103, language itself based on the logic of the earlier decision in *Hotchkiss v. Greenwood*, 52 U.S. 248, 11 How. 248, 13 L. Ed. 683 (1851), and its progeny. See 383 U.S., at 15-17, 86 S. Ct. 684, 15 L. Ed. 2d 545. The analysis is objective:

"Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background the obviousness or nonobviousness of the subject matter is determined. Such secondary considerations [***18] as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented." *Id.*, at 17-18, 86 S. Ct. 684, 15 L. Ed. 2d 545.

While the sequence of these questions might be reordered in any particular case, the factors continue to define the inquiry that controls. If a court, or patent examiner, conducts this analysis and concludes the claimed subject matter was obvious, the claim is invalid under § 103.

Seeking to resolve the question of obviousness with more uniformity and consistency, the Court of Appeals for the Federal Circuit has employed an approach referred to by the parties as the "teaching, suggestion, or motivation" test (TSM test), under which a patent claim is only proved obvious if "some motivation or suggestion to combine the prior art teachings" can be found in the prior art, the nature of the problem, or the knowledge of a person having ordinary skill in the art. See, e.g., *Al-Site Corp. v. VSI Int'l, Inc.*, 174 F.3d 1308, 1323-1324 (CA Fed. 1999). KSR challenges that [**1735] test, or at least its application in this case. See 119 Fed. Appx. 282, 286-290 (CA Fed. 2005). [***19] Because the Court of Appeals addressed the question of obviousness in a manner contrary to § 103 and our precedents, we granted certiorari, 547 U.S. , 126 S. Ct. 2965, 165 L. Ed. 2d 949 (2006). We now reverse.

I

A

In car engines without computer-controlled throttles, the accelerator pedal interacts with the throttle via cable or other mechanical link. The pedal arm acts as a lever rotating around a pivot point. In a cable-actuated throttle control the rotation caused by pushing down the pedal pulls a cable, which in turn pulls open valves in the carburetor or fuel injection unit. The wider the valves

127 S. Ct. 1727, *1735; 167 L. Ed. 2d 705, **715;
2007 U.S. LEXIS 4745, ***19; 75 U.S.L.W. 4289

open, the more fuel and air are released, causing combustion to increase and the car to accelerate. When the driver takes his foot off the pedal, the opposite occurs as the cable is released and the valves slide closed.

In the 1990's it became more common to install computers in cars to control engine operation. Computer-controlled throttles open and close valves in response to electronic signals, not through force transferred from the pedal by a mechanical link. Constant, delicate adjustments of air and fuel mixture are possible. The computer's rapid processing of factors beyond the pedal's position improves [***20] [**716] fuel efficiency and engine performance.

For a computer-controlled throttle to respond to a driver's operation of the car, the computer must know what is happening with the pedal. A cable or mechanical link does not suffice for this purpose; at some point, an electronic sensor is necessary to translate the mechanical operation into digital data the computer can understand.

Before discussing sensors further we turn to the mechanical design of the pedal itself. In the traditional design a pedal can be pushed down or released but cannot have its position in the footwell adjusted by sliding the pedal forward or back. As a result, a driver who wishes to be closer or farther from the pedal must either reposition himself in the driver's seat or move the seat in some way. In cars with deep footwells these are imperfect solutions for drivers of smaller stature. To solve the problem, inventors, beginning in the 1970's, designed pedals that could be adjusted to change their location in the footwell. Important for this case are two adjustable pedals disclosed in *U.S. Patent Nos. 5,010,782* (filed July 28, 1989) (Asano) and *5,460,061* (filed Sept. 17, 1993) (Redding). The Asano patent reveals a [***21] support structure that houses the pedal so that even when the pedal location is adjusted relative to the driver, one of the pedal's pivot points stays fixed. The pedal is also designed so that the force necessary to push the pedal down is the same regardless of adjustments to its location. The Redding patent reveals a different, sliding mechanism where both the pedal and the pivot point are adjusted.

We return to sensors. Well before Engelgau applied for his challenged patent, some inventors had obtained patents involving electronic pedal sensors for computer-controlled throttles. These inventions, such as the device disclosed in *U.S. Patent No. 5,241,936* (filed

Sept. 9, 1991) ('936), taught that it was preferable to detect the pedal's position in the pedal assembly, not in the engine. The '936 patent disclosed a pedal with an electronic sensor on a pivot point in the pedal assembly. *U.S. Patent No. 5,063,811* (filed July 9, 1990) (Smith) taught that to prevent the [*1736] wires connecting the sensor to the computer from chafing and wearing out, and to avoid grime and damage from the driver's foot, the sensor should be put on a fixed part of the pedal assembly rather than in or on the pedal's [***22] footpad.

In addition to patents for pedals with integrated sensors inventors obtained patents for self-contained modular sensors. A modular sensor is designed independently of a given pedal so that it can be taken off the shelf and attached to mechanical pedals of various sorts, enabling the pedals to be used in automobiles with computer-controlled throttles. One such sensor was disclosed in *U.S. Patent No. 5,385,068* (filed Dec. 18, 1992) ('068). In 1994, Chevrolet manufactured a line of trucks using modular sensors "attached to the pedal support bracket, adjacent to the pedal and engaged with the pivot shaft about which the pedal rotates in operation." 298 F. Supp. 2d 581, 589 (E.D. Mich. 2003).

The prior art contained patents involving the placement of sensors on adjustable pedals as well. For example, *U.S. Patent No. 5,819,593* (filed Aug. 17, 1995) (Rixon) discloses an adjustable pedal assembly with an [**717] electronic sensor for detecting the pedal's position. In the Rixon pedal the sensor is located in the pedal footpad. The Rixon pedal was known to suffer from wire chafing when the pedal was depressed and released.

This short account of pedal and sensor technology leads [***23] to the instant case.

B

KSR, a Canadian company, manufactures and supplies auto parts, including pedal systems. Ford Motor Company hired KSR in 1998 to supply an adjustable pedal system for various lines of automobiles with cable-actuated throttle controls. KSR developed an adjustable mechanical pedal for Ford and obtained *U.S. Patent No. 6,151,976* (filed July 16, 1999) ('976) for the design. In 2000, KSR was chosen by General Motors Corporation (GMC or GM) to supply adjustable pedal systems for Chevrolet and GMC light trucks that used engines with computer-controlled throttles. To make the '976 pedal compatible with the trucks, KSR merely took

127 S. Ct. 1727, *1736; 167 L. Ed. 2d 705, **717;
2007 U.S. LEXIS 4745, ***23; 75 U.S.L.W. 4289

that design and added a modular sensor.

Teleflex is a rival to KSR in the design and manufacture of adjustable pedals. As noted, it is the exclusive licensee of the Engelgau patent. Engelgau filed the patent application on August 22, 2000 as a continuation of a previous application for *U.S. Patent No. 6,109,241*, which was filed on January 26, 1999. He has sworn he invented the patent's subject matter on February 14, 1998. The Engelgau patent discloses an adjustable electronic pedal described in the specification as a "simplified vehicle control [***24] pedal assembly that is less expensive, and which uses fewer parts and is easier to package within the vehicle." Engelgau, col. 2, lines 2-5, Supplemental App. 6. Claim 4 of the patent, at issue here, describes:

"A vehicle control pedal apparatus comprising:

a support adapted to be mounted to a vehicle structure;

an adjustable pedal assembly having a pedal arm moveable in fore and aft directions with respect to said support;

a pivot for pivotally supporting said adjustable pedal assembly with respect to said support and defining a pivot axis; and

an electronic control attached to said support for controlling a vehicle system;

said apparatus characterized by said electronic control being responsive to said pivot for providing a signal that corresponds to pedal arm position as said pedal arm pivots about said pivot [*1737] axis between rest and applied positions wherein the position of said pivot remains constant while said pedal arm moves in fore and aft directions with respect to said pivot." *Id.*, col. 6, lines 17-36, Supplemental App. 8 (diagram numbers omitted).

We agree with the District Court that the claim discloses "a position-adjustable pedal [***25] assembly with an electronic pedal position sensor attached to the support member of the pedal assembly. Attaching the sensor to

the support member allows the sensor to remain in a fixed position while the driver adjusts the pedal." 298 F. Supp. 2d, at 586-587.

Before issuing the Engelgau patent the U.S. Patent and Trademark Office (PTO) rejected one of the patent claims that was similar to, but [*718] broader than, the present claim 4. The claim did not include the requirement that the sensor be placed on a fixed pivot point. The PTO concluded the claim was an obvious combination of the prior art disclosed in Redding and Smith, explaining:

"Since the prior art references are from the field of endeavor, the purpose disclosed . . . would have been recognized in the pertinent art of Redding. Therefore it would have been obvious . . . to provide the device of Redding with the . . . means attached to a support member as taught by Smith." *Id.*, at 595.

In other words Redding provided an example of an adjustable pedal and Smith explained how to mount a sensor on a pedal's support structure, and the rejected patent claim merely put these two teachings together.

[***26] Although the broader claim was rejected, claim 4 was later allowed because it included the limitation of a fixed pivot point, which distinguished the design from Redding's. *Ibid.* Engelgau had not included Asano among the prior art references, and Asano was not mentioned in the patent's prosecution. Thus, the PTO did not have before it an adjustable pedal with a fixed pivot point. The patent issued on May 29, 2001 and was assigned to Teleflex.

Upon learning of KSR's design for GM, Teleflex sent a warning letter informing KSR that its proposal would violate the Engelgau patent. "Teleflex believes that any supplier of a product that combines an adjustable pedal with an electronic throttle control necessarily employs technology covered by one or more" of Teleflex's patents. *Id.*, at 585. KSR refused to enter a royalty arrangement with Teleflex; so Teleflex sued for infringement, asserting KSR's pedal infringed the Engelgau patent and two other patents. *Ibid.* Teleflex later abandoned its claims regarding the other patents and dedicated the patents to the public. The remaining contention was that KSR's pedal system for GM infringed

claim 4 of the Engelgau patent. [***27] Teleflex has not argued that the other three claims of the patent are infringed by KSR's pedal, nor has Teleflex argued that the mechanical adjustable pedal designed by KSR for Ford infringed any of its patents.

C

The District Court granted summary judgment in KSR's favor. After reviewing the pertinent history of pedal design, the scope of the Engelgau patent, and the relevant prior art, the court considered the validity of the contested claim. By direction of 35 U.S.C. § 282, an issued patent is presumed valid. The District Court applied *Graham's* framework to determine whether under summary-judgment standards KSR had overcome the presumption and demonstrated that claim 4 was obvious in light of the prior art in existence when [*1738] the claimed subject matter was invented. See § 102(a).

The District Court determined, in light of the expert testimony and the parties' stipulations, that the level of ordinary skill in pedal design was "an undergraduate degree in mechanical engineering (or an equivalent amount of industry experience) [and] familiarity with pedal control systems for vehicles." 298 F. Supp. 2d, at 590. The court then set forth the [***28] relevant prior art, including the patents and pedal designs described above.

[**719] Following *Graham's* direction, the court compared the teachings of the prior art to the claims of Engelgau. It found "little difference." 298 F. Supp. 2d, at 590. Asano taught everything contained in claim 4 except the use of a sensor to detect the pedal's position and transmit it to the computer controlling the throttle. That additional aspect was revealed in sources such as the '068 patent and the sensors used by Chevrolet.

Under the controlling cases from the Court of Appeals for the Federal Circuit, however, the District Court was not permitted to stop there. The court was required also to apply the TSM test. The District Court held KSR had satisfied the test. It reasoned (1) the state of the industry would lead inevitably to combinations of electronic sensors and adjustable pedals, (2) Rixon provided the basis for these developments, and (3) Smith taught a solution to the wire chafing problems in Rixon, namely locating the sensor on the fixed structure of the pedal. This could lead to the combination of Asano, or a pedal like it, with a pedal position sensor.

The conclusion that the [***29] Engelgau design was obvious was supported, in the District Court's view, by the PTO's rejection of the broader version of claim 4. Had Engelgau included Asano in his patent application, it reasoned, the PTO would have found claim 4 to be an obvious combination of Asano and Smith, as it had found the broader version an obvious combination of Redding and Smith. As a final matter, the District Court held that the secondary factor of Teleflex's commercial success with pedals based on Engelgau's design did not alter its conclusion. The District Court granted summary judgment for KSR.

With principal reliance on the TSM test, the Court of Appeals reversed. It ruled the District Court had not been strict enough in applying the test, having failed to make "findings as to the specific understanding or principle within the knowledge of a skilled artisan that would have motivated one with no knowledge of [the] invention' . . . to attach an electronic control to the support bracket of the Asano assembly." 119 Fed. Appx., at 288 (brackets in original) (quoting *In re Kotzab*, 217 F.3d 1365, 1371 (CA Fed. 2000)). The Court of Appeals held that the District Court was [***30] incorrect that the nature of the problem to be solved satisfied this requirement because unless the "prior art references addressed the precise problem that the patentee was trying to solve," the problem would not motivate an inventor to look at those references. 119 Fed. Appx., at 288.

Here, the Court of Appeals found, the Asano pedal was designed to solve the "constant ratio problem" -- that is, to ensure that the force required to depress the pedal is the same no matter how the pedal is adjusted -- whereas Engelgau sought to provide a simpler, smaller, cheaper adjustable electronic pedal. *Ibid.* As for Rixon, the court explained, that pedal suffered from the problem of wire chafing but was not designed to solve it. In the court's view Rixon did not teach anything helpful to Engelgau's purpose. Smith, in turn, did not relate to adjustable pedals and did not "necessarily go to the issue of motivation [*1739] to attach the electronic control on the support bracket of the pedal assembly." *Ibid.* When the patents were interpreted in this way, the Court of Appeals held, they would not have led a person of ordinary skill to put a sensor on the sort of pedal described in Asano.

[***31] [**720] That it might have been obvious to try the combination of Asano and a sensor was

127 S. Ct. 1727, *1739; 167 L. Ed. 2d 705, **720;
2007 U.S. LEXIS 4745, ***31; 75 U.S.L.W. 4289

likewise irrelevant, in the court's view, because "'obvious to try" has long been held not to constitute obviousness.'" *Id.*, at 289 (quoting *In re Deuel*, 51 F.3d 1552, 1559 (CA Fed. 1995)).

The Court of Appeals also faulted the District Court's consideration of the PTO's rejection of the broader version of claim 4. The District Court's role, the Court of Appeals explained, was not to speculate regarding what the PTO might have done had the Engelgau patent mentioned Asano. Rather, the court held, the District Court was obliged first to presume that the issued patent was valid and then to render its own independent judgment of obviousness based on a review of the prior art. The fact that the PTO had rejected the broader version of claim 4, the Court of Appeals said, had no place in that analysis.

The Court of Appeals further held that genuine issues of material fact precluded summary judgment. Teleflex had proffered statements from one expert that claim 4 "was a simple, elegant, and novel combination of features," 119 Fed. Appx., at 290, compared to Rixon, ***32] and from another expert that claim 4 was nonobvious because, unlike in Rixon, the sensor was mounted on the support bracket rather than the pedal itself. This evidence, the court concluded, sufficed to require a trial.

II

A

We begin by rejecting the rigid approach of the Court of Appeals. Throughout this Court's engagement with the question of obviousness, our cases have set forth an expansive and flexible approach inconsistent with the way the Court of Appeals applied its TSM test here. To be sure, *Graham* recognized the need for "uniformity and definiteness." 383 U.S., at 18, 86 S. Ct. 684, 15 L. Ed. 2d 545. Yet the principles laid down in *Graham* reaffirmed the "functional approach" of *Hotchkiss*, 52 U.S. 248, 11 How. 248, 13 L. Ed. 683. See 383 U.S., at 12, 86 S. Ct. 684, 15 L. Ed. 2d 545. To this end, *Graham* set forth a broad inquiry and invited courts, where appropriate, to look at any secondary considerations that would prove instructive. *Id.*, at 17, 86 S. Ct. 684, 15 L. Ed. 2d 545.

Neither the enactment of § 103 nor the analysis in *Graham* disturbed this Court's earlier instructions concerning the need for caution in granting a patent based

on the combination of elements found in the prior art. For over a half century, [***33] the Court has held that a "patent for a combination which only unites old elements with no change in their respective functions . . . obviously withdraws what is already known into the field of its monopoly and diminishes the resources available to skillful men." *Great Atlantic & Pacific Tea Co. v. Supermarket Equipment Corp.*, 340 U.S. 147, 152, 71 S. Ct. 127, 95 L. Ed. 162, 1951 Dec. Comm'r Pat. 572 (1950). This is a principal reason for declining to allow patents for what is obvious. The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results. Three cases decided after *Graham* illustrate the application of this doctrine.

In *United States v. Adams*, 383 U.S. 39, 40, 86 S. Ct. 708, 15 L. Ed. 2d 572, 174 Ct. Cl. 1293 (1966), a companion case to *Graham*, the Court considered the obviousness of a "wet battery" that varied from [**721] prior designs in two ways: [*1740] It contained water, rather than the acids conventionally employed in storage batteries; and its electrodes were magnesium and cuprous chloride, rather than zinc and silver chloride. The Court recognized that when a patent claims a structure already known in the prior art that is altered by the mere substitution of one [***34] element for another known in the field, the combination must do more than yield a predictable result. 383 U.S., at 50-51, 86 S. Ct. 708, 15 L. Ed. 2d 572, 174 Ct. Cl. 1293. It nevertheless rejected the Government's claim that Adams's battery was obvious. The Court relied upon the corollary principle that when the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be nonobvious. *Id.*, at 51-52, 86 S. Ct. 708, 15 L. Ed. 2d 572, 174 Ct. Cl. 1293. When Adams designed his battery, the prior art warned that risks were involved in using the types of electrodes he employed. The fact that the elements worked together in an unexpected and fruitful manner supported the conclusion that Adams's design was not obvious to those skilled in the art.

In *Anderson's-Black Rock, Inc. v. Pavement Salvage Co.*, 396 U.S. 57, 90 S. Ct. 305, 24 L. Ed. 2d 258 (1969), the Court elaborated on this approach. The subject matter of the patent before the Court was a device combining two pre-existing elements: a radiant-heat burner and a paving machine. The device, the Court concluded, did not create some new synergy: The radiant-heat burner

127 S. Ct. 1727, *1740; 167 L. Ed. 2d 705, **721;
2007 U.S. LEXIS 4745, ***34; 75 U.S.L.W. 4289

functioned just as a burner was expected to function; and the paving machine did [***35] the same. The two in combination did no more than they would in separate, sequential operation. *Id.*, at 60-62, 90 S. Ct. 305, 24 L. Ed. 2d 258. In those circumstances, "while the combination of old elements performed a useful function, it added nothing to the nature and quality of the radiant-heat burner already patented," and the patent failed under § 103. *Id.*, at 62, 90 S. Ct. 305, 24 L. Ed. 2d 258 (footnote omitted).

Finally, in *Sakraida v. AG Pro, Inc.*, 425 U.S. 273, 96 S. Ct. 1532, 47 L. Ed. 2d 784 (1976), the Court derived from the precedents the conclusion that when a patent "simply arranges old elements with each performing the same function it had been known to perform" and yields no more than one would expect from such an arrangement, the combination is obvious. *Id.*, at 282, 96 S. Ct. 1532, 47 L. Ed. 2d 784.

The principles underlying these cases are instructive when the question is whether a patent claiming the combination of elements of prior art is obvious. When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability. For [***36] the same reason, if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill. *Sakraida* and *Anderson's-Black Rock* are illustrative -- a court must ask whether the improvement is more than the predictable use of prior art elements according to their established functions.

Following these principles may be [**722] more difficult in other cases than it is here because the claimed subject matter may involve more than the simple substitution of one known element for another or the mere application of a known technique to a piece of prior art ready for the improvement. Often, it will be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having [*1741] ordinary skill in the art, all in order to determine whether there was an apparent reason to combine the

known elements in the fashion claimed by the patent at issue. To facilitate review, this analysis [***37] should be made explicit. See *In re Kahn*, 441 F.3d 977, 988 (CA Fed. 2006) ("Rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness"). As our precedents make clear, however, the analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.

B

When it first established the requirement of demonstrating a teaching, suggestion, or motivation to combine known elements in order to show that the combination is obvious, the Court of Customs and Patent Appeals captured a helpful insight. See *Application of Bergel*, 292 F.2d 955, 956-957, 48 C.C.P.A. 1102, 1961 Dec. Comm'r Pat. 504 (1961). As is clear from cases such as *Adams*, a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art. Although common sense directs one to look with care at a patent application that claims as innovation [***38] the combination of two known devices according to their established functions, it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does. This is so because inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known.

Helpful insights, however, need not become rigid and mandatory formulas; and when it is so applied, the TSM test is incompatible with our precedents. The obviousness analysis cannot be confined by a formalistic conception of the words teaching, suggestion, and motivation, or by overemphasis on the importance of published articles and the explicit content of issued patents. The diversity of inventive pursuits and of modern technology counsels against limiting the analysis in this way. In many fields it may be that there is little discussion of obvious techniques or combinations, and it often may be the case that market demand, rather than

127 S. Ct. 1727, *1741; 167 L. Ed. 2d 705, **722;
2007 U.S. LEXIS 4745, ***38; 75 U.S.L.W. 4289

scientific literature, will drive design trends. Granting patent protection [***39] to advances that would occur in the ordinary course without real innovation retards progress and may, in the case of patents combining previously known elements, deprive prior inventions of their value or utility.

In the years since the Court of Customs and Patent Appeals set forth the [**723] essence of the TSM test, the Court of Appeals no doubt has applied the test in accord with these principles in many cases. There is no necessary inconsistency between the idea underlying the TSM test and the *Graham* analysis. But when a court transforms the general principle into a rigid rule that limits the obviousness inquiry, as the Court of Appeals did here, it errs.

C

The flaws in the analysis of the Court of Appeals relate for the most part to the court's narrow conception of the obviousness inquiry reflected in its application of the TSM test. In determining whether the subject matter of a patent claim is obvious, neither the particular motivation nor the avowed purpose of the [*1742] patentee controls. What matters is the objective reach of the claim. If the claim extends to what is obvious, it is invalid under § 103. One of the ways in which a patent's subject matter can be proved obvious is [***40] by noting that there existed at the time of invention a known problem for which there was an obvious solution encompassed by the patent's claims.

The first error of the Court of Appeals in this case was to foreclose this reasoning by holding that courts and patent examiners should look only to the problem the patentee was trying to solve. *119 Fed. Appx.*, at 288. The Court of Appeals failed to recognize that the problem motivating the patentee may be only one of many addressed by the patent's subject matter. The question is not whether the combination was obvious to the patentee but whether the combination was obvious to a person with ordinary skill in the art. Under the correct analysis, any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.

The second error of the Court of Appeals lay in its assumption that a person of ordinary skill attempting to solve a problem will be led only to those elements of

prior art designed to solve the same problem. *Ibid.* The primary purpose of Asano was solving the constant ratio problem; so, the court concluded, [***41] an inventor considering how to put a sensor on an adjustable pedal would have no reason to consider putting it on the Asano pedal. *Ibid.* Common sense teaches, however, that familiar items may have obvious uses beyond their primary purposes, and in many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle. Regardless of Asano's primary purpose, the design provided an obvious example of an adjustable pedal with a fixed pivot point; and the prior art was replete with patents indicating that a fixed pivot point was an ideal mount for a sensor. The idea that a designer hoping to make an adjustable electronic pedal would ignore Asano because Asano was designed to solve the constant ratio problem makes little sense. A person of ordinary skill is also a person of ordinary creativity, not an automaton.

The same constricted analysis led the Court of Appeals to conclude, in error, that a patent claim cannot be proved obvious merely by showing that the combination of elements was "obvious to try." *Id.*, at 289 (internal quotation marks omitted). When there is a design need or market pressure to solve a problem [***42] and there are a finite number of identified, predictable [**724] solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense. In that instance the fact that a combination was obvious to try might show that it was obvious under § 103.

The Court of Appeals, finally, drew the wrong conclusion from the risk of courts and patent examiners falling prey to hindsight bias. A factfinder should be aware, of course, of the distortion caused by hindsight bias and must be cautious of arguments reliant upon *ex post* reasoning. See *Graham*, 383 U.S., at 36, 86 S. Ct. 684, 15 L. Ed. 2d 545 (warning against a "temptation to read into the prior art the teachings of the invention in issue" and instructing courts to "guard against slipping into the use of hindsight" (quoting *Monroe Auto Equipment Co. v. Heckethorn Mfg. & Supply Co.*, 332 F.2d 406, 412 (CA6 1964))). Rigid preventative rules that deny factfinders recourse to common sense, however, are [**743] neither necessary under our case law nor consistent with it.

127 S. Ct. 1727, *1743; 167 L. Ed. 2d 705, **724;
2007 U.S. LEXIS 4745, ***42; 75 U.S.L.W. 4289

We note the [***43] Court of Appeals has since elaborated a broader conception of the TSM test than was applied in the instant matter. See, e.g., *DyStar Textilfarben GmbH & Co. Deutschland KG v. C. H. Patrick Co.*, 464 F.3d 1356, 1367 (2006) ("Our suggestion test is in actuality quite flexible and not only permits, but *requires*, consideration of common knowledge and common sense"); *Alza Corp. v. Mylan Labs., Inc.*, 464 F.3d 1286, 1291 (2006) ("There is flexibility in our obviousness jurisprudence because a motivation may be found *implicitly* in the prior art. We do not have a rigid test that requires an actual teaching to combine . . ."). Those decisions, of course, are not now before us and do not correct the errors of law made by the Court of Appeals in this case. The extent to which they may describe an analysis more consistent with our earlier precedents and our decision here is a matter for the Court of Appeals to consider in its future cases. What we hold is that the fundamental misunderstandings identified above led the Court of Appeals in this case to apply a test inconsistent with our patent law decisions.

III

When we apply the standards we have [***44] explained to the instant facts, claim 4 must be found obvious. We agree with and adopt the District Court's recitation of the relevant prior art and its determination of the level of ordinary skill in the field. As did the District Court, we see little difference between the teachings of Asano and Smith and the adjustable electronic pedal disclosed in claim 4 of the Engelgau patent. A person having ordinary skill in the art could have combined Asano with a pedal position sensor in a fashion encompassed by claim 4, and would have seen the benefits of doing so.

A

Teleflex argues in passing that the Asano pedal cannot be combined with a sensor in the manner described by claim 4 because of the design of Asano's pivot mechanisms. See Brief for Respondents 48-49, and n. 17. Therefore, Teleflex reasons, even if adding a sensor to Asano was obvious, that does not establish that claim 4 encompasses obvious subject matter. This argument was not, however, [**725] raised before the District Court. There Teleflex was content to assert only that the problem motivating the invention claimed by the Engelgau patent would not lead to the solution of combining of Asano with a sensor. See Teleflex's

Response [***45] to KSR's Motion for Summary Judgment of Invalidity in No. 02-74586 (E.D. Mich.), pp. 18-20, App. 144a-146a. It is also unclear whether the current argument was raised before the Court of Appeals, where Teleflex advanced the nonspecific, conclusory contention that combining Asano with a sensor would not satisfy the limitations of claim 4. See Brief for Plaintiffs-Appellants in No. 04-1152 (C.A. Fed.), pp. 42-44. Teleflex's own expert declarations, moreover, do not support the point Teleflex now raises. See Declaration of Clark J. Radcliffe, Ph.D., Supplemental App. 204-207; Declaration of Timothy L. Andresen, *id.*, at 208-210. The only statement in either declaration that might bear on the argument is found in the Radcliffe declaration:

Asano . . . and Rixon . . . are complex mechanical linkage-based devices that are expensive to produce and assemble and difficult to package. It is exactly these difficulties with prior art designs that [Engelgau] resolves. The use of an adjustable pedal with a single pivot reflecting pedal position combined with an electronic control mounted between the [**1744] support and the adjustment assembly at that pivot was a simple, elegant, and novel combination [***46] of features in the Engelgau '565 patent." *Id.*, at 206, P16.

Read in the context of the declaration as a whole this is best interpreted to mean that Asano could not be used to solve "the problem addressed by Engelgau '565[:]" to provide a less expensive, more quickly assembled, and smaller package adjustable pedal assembly with electronic control." *Id.*, at 205, P10.

The District Court found that combining Asano with a pivot-mounted pedal position sensor fell within the scope of claim 4, 298 F. Supp. 2d, at 592-593. Given the significance of that finding to the District Court's judgment, it is apparent that Teleflex would have made clearer challenges to it if it intended to preserve this claim. In light of Teleflex's failure to raise the argument in a clear fashion, and the silence of the Court of Appeals on the issue, we take the District Court's conclusion on the point to be correct.

B

127 S. Ct. 1727, *1744; 167 L. Ed. 2d 705, **725;
2007 U.S. LEXIS 4745, ***46; 75 U.S.L.W. 4289

The District Court was correct to conclude that, as of the time Engelgau designed the subject matter in claim 4, it was obvious to a person of ordinary skill to combine Asano with a pivot-mounted pedal position sensor. There then existed a marketplace that created a strong [***47] incentive to convert mechanical pedals to electronic pedals, and the prior art taught a number of methods for achieving this advance. The Court of Appeals considered the issue too narrowly by, in effect, asking whether a pedal designer writing on a blank slate would have chosen both Asano and a modular sensor similar to the ones used in the Chevrolet truckline and disclosed in the '068 patent. The District Court employed this narrow inquiry as well, though it reached the correct result nevertheless. The proper question to have asked was whether a pedal designer of ordinary skill, facing the wide range of needs created by developments in the field of endeavor, [*726] would have seen a benefit to upgrading Asano with a sensor.

In automotive design, as in many other fields, the interaction of multiple components means that changing one component often requires the others to be modified as well. Technological developments made it clear that engines using computer-controlled throttles would become standard. As a result, designers might have decided to design new pedals from scratch; but they also would have had reason to make pre-existing pedals work with the new engines. Indeed, upgrading its [***48] own pre-existing model led KSR to design the pedal now accused of infringing the Engelgau patent.

For a designer starting with Asano, the question was where to attach the sensor. The consequent legal question, then, is whether a pedal designer of ordinary skill starting with Asano would have found it obvious to put the sensor on a fixed pivot point. The prior art discussed above leads us to the conclusion that attaching the sensor where both KSR and Engelgau put it would have been obvious to a person of ordinary skill.

The '936 patent taught the utility of putting the sensor on the pedal device, not in the engine. Smith, in turn, explained to put the sensor not on the pedal's footpad but instead on its support structure. And from the known wire-chafing problems of Rixon, and Smith's teaching that "the pedal assemblies must not precipitate any motion in the connecting wires," Smith, col. 1, lines 35-37, Supplemental App. 274, the designer would know to place the sensor on a nonmoving part of the pedal

structure. The most obvious nonmoving point on the structure from which a sensor can [*1745] easily detect the pedal's position is a pivot point. The designer, accordingly, would follow Smith [***49] in mounting the sensor on a pivot, thereby designing an adjustable electronic pedal covered by claim 4.

Just as it was possible to begin with the objective to upgrade Asano to work with a computer-controlled throttle, so too was it possible to take an adjustable electronic pedal like Rixon and seek an improvement that would avoid the wire-chafing problem. Following similar steps to those just explained, a designer would learn from Smith to avoid sensor movement and would come, thereby, to Asano because Asano disclosed an adjustable pedal with a fixed pivot.

Teleflex indirectly argues that the prior art taught away from attaching a sensor to Asano because Asano in its view is bulky, complex, and expensive. The only evidence Teleflex marshals in support of this argument, however, is the Radcliffe declaration, which merely indicates that Asano would not have solved Engelgau's goal of making a small, simple, and inexpensive pedal. What the declaration does not indicate is that Asano was somehow so flawed that there was no reason to upgrade it, or pedals like it, to be compatible with modern engines. Indeed, Teleflex's own declarations refute this conclusion. Dr. Radcliffe states that [***50] Rixon suffered from the same bulk and complexity as did Asano. See *id.*, at 206. Teleflex's other expert, however, explained that Rixon was itself designed by adding a sensor to a pre-existing mechanical pedal. See *id.*, at 209. If Rixon's base pedal was not too flawed to upgrade, then Dr. Radcliffe's declaration does not show Asano was either. Teleflex may have made a plausible argument that Asano is inefficient as compared [***727] to Engelgau's preferred embodiment, but to judge Asano against Engelgau would be to engage in the very hindsight bias Teleflex rightly urges must be avoided. Accordingly, Teleflex has not shown anything in the prior art that taught away from the use of Asano.

Like the District Court, finally, we conclude Teleflex has shown no secondary factors to dislodge the determination that claim 4 is obvious. Proper application of *Graham* and our other precedents to these facts therefore leads to the conclusion that claim 4 encompassed obvious subject matter. As a result, the claim fails to meet the requirement of § 103.

We need not reach the question whether the failure to disclose Asano during the prosecution of Engelgau voids the presumption of validity given [***51] to issued patents, for claim 4 is obvious despite the presumption. We nevertheless think it appropriate to note that the rationale underlying the presumption -- that the PTO, in its expertise, has approved the claim -- seems much diminished here.

IV

A separate ground the Court of Appeals gave for reversing the order for summary judgment was the existence of a dispute over an issue of material fact. We disagree with the Court of Appeals on this point as well. To the extent the court understood the *Graham* approach to exclude the possibility of summary judgment when an expert provides a conclusory affidavit addressing the question of obviousness, it misunderstood the role expert testimony plays in the analysis. In considering summary judgment on that question the district court can and should take into account expert testimony, which may resolve or keep open certain questions of fact. That is not the end of the issue, however. The ultimate judgment of obviousness is a legal determination. *Graham*, 383 U.S., at 17, 86 S. Ct. 684, 15 L. Ed. 2d 545. Where, as here, the content of the prior art, the scope of the patent [*1746] claim, and the level of ordinary skill in the art are not in material dispute, and [***52] the obviousness of the claim is apparent in light of these factors, summary judgment is appropriate. Nothing in the declarations proffered by Teleflex prevented the District Court from reaching the careful conclusions underlying its order for summary judgment in this case.

* * *

We build and create by bringing to the tangible and palpable reality around us new works based on instinct, simple logic, ordinary inferences, extraordinary ideas, and sometimes even genius. These advances, once part of our shared knowledge, define a new threshold from which innovation starts once more. And as progress beginning from higher levels of achievement is expected in the normal course, the results of ordinary innovation are not the subject of exclusive rights under the patent laws. Were it otherwise patents might stifle, rather than promote, the progress of useful arts. See *U.S. Const., Art. I, § 8, cl. 8*. These premises led to the bar on patents claiming obvious subject matter established in *Hotchkiss* and codified in § 103. Application of the bar must not be confined within a test or formulation too constrained to serve its purpose.

KSR provided convincing evidence that mounting a modular [***53] sensor on a fixed pivot point of the Asano pedal was a design step well within the [**728] grasp of a person of ordinary skill in the relevant art. Its arguments, and the record, demonstrate that claim 4 of the Engelgau patent is obvious. In rejecting the District Court's rulings, the Court of Appeals analyzed the issue in a narrow, rigid manner inconsistent with § 103 and our precedents. The judgment of the Court of Appeals is reversed, and the case remanded for further proceedings consistent with this opinion.

It is so ordered.

LEXSEE 437 F.3D 1157

MEDICHEM, S.A., Plaintiff-Appellee, v. ROLABO, S.L., Defendant-Appellant.**05-1179, 05-1248****UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT****437 F.3d 1157; 2006 U.S. App. LEXIS 2653; 77 U.S.P.Q.2D (BNA) 1865****February 3, 2006, Decided**

SUBSEQUENT HISTORY: Rehearing denied by, Rehearing, en banc, denied by *Medichem, S.A. v. Rolabo, S.L.*, 2006 U.S. App. LEXIS 7669 (*Fed. Cir., Mar. 15, 2006*)

PRIOR HISTORY: [**1] Appealed from: United States District Court for the Southern District of New York. Judge Jed S. Rakoff.
Medichem, S.A. v. Rolabo, S.L., 2004 U.S. Dist. LEXIS 23697 (*S.D.N.Y., Nov. 19, 2004*)

DISPOSITION: AFFIRMED-IN-PART,
REVERSED-IN-PART.

COUNSEL: John G. Taylor, Frommer Lawrence & Haug LLP, of New York, New York, argued for plaintiff-appellee. With him on the brief were Barry S. White and James K. Stronski.

Thomas P. Heneghan, Michael Best & Friedrich LLP, of Madison, Wisconsin, argued for defendant-appellant. With him on the brief were Jeffrey S. Ward and Charlene L. Yager.

JUDGES: Before SCHALL, GAJARSA, DYK, Circuit Judges.

OPINION BY: GAJARSA

OPINION

[*1160] GAJARSA, Circuit Judge.

This is the second round of a protracted litigation to establish priority of invention between Stampa et al.'s *U.S. Patent No. 6,084,100* ("the '100 patent'"), assigned to

Medichem, S.A. ("Medichem"), and Jackson's *U.S. Patent No. 6,093,827* ("the '827 patent'"), assigned to Rolabo, S.L. ("Rolabo"). In the first round appealed to this court, we remanded to the district court, requiring it to establish an interference-in-fact under 35 U.S.C. § 291 before determining priority. *Medichem, S.A. v. Rolabo, S.L.*, 353 F.3d 928 (*Fed. Cir. 2003*) ("Medichem II"). Rolabo now appeals [**2] from the judgment on remand, in which the United States District Court for the Southern District of New York found the existence of an interference-in-fact and awarded priority of invention to Medichem. See *Medichem, S.A. v. Rolabo, S.L.*, *Memorandum Order*, 2004 U.S. Dist. LEXIS 23697, No. 01 Civ. 3087, 2004 WL 2674632 (*S.D.N.Y. Nov. 22, 2004*) ("Medichem III"). For the reasons discussed below, we affirm the judgment of the district court on the proper establishment of the interfering subject matter and on the finding of the existence of an interference-in-fact. We reverse, however, the district court's award of priority to Medichem, based on the insufficiency of the evidence that Medichem introduced at trial to corroborate the testimony of its inventors regarding reduction to practice of the invention.

BACKGROUND

A. The Patents

Medichem and Rolabo are both pharmaceutical manufacturers based in Barcelona, Spain. Rolabo's '827 patent and Medichem's '100 patent both claim a process for making loratadine from two precursor chemicals via a chemical reaction known as the McMurry reaction. Loratadine is the active ingredient in the allergy medication Claritin (R). McMurry reactions involve the [**3] coupling of two starting materials in the presence of low-valent titanium. In general, McMurry reactions

can lead to two types of products, diols and alkenes; loratadine, the desired end product of this reaction, is an alkene. McMurtry reactions can be optimized for alkene production by adjusting various reaction parameters, such as the temperature and length of the reaction in this case, and also by adding additional reactants. The only significant difference between the processes claimed by Medichem¹ and Rolabo² is that Medichem's [*1161] process requires the reaction to be carried out in the presence of a type of chemical known as a tertiary amine.

3 In contrast, the Rolabo process permits by not excluding, but does not require, the presence of a tertiary amine. Conceptually, therefore, the Medichem invention, which requires a tertiary amine, is a species within the genus of the Rolabo invention.

1 Claims 1 and 2 of Medichem's '100 patent read:

1. A process for the preparation of loratadine consisting of reacting, in an organic solvent and in the presence of a tertiary amine, 8-chloro-5,6-dihydrobenzo[5,6]cyclohepta[1,2-b]pyridin-11-one, of formula VII with a low-valent titanium species. (emphasis added).

2. The process of claim 1, wherein the low-valent titanium species are generated by reduction of titanium tetrachloride with zinc dust.

[**4]

2 Claims 1 and 17 of Rolabo's '827 patent read:

1. A process for preparing 5,6-dihydro-11H-dibenzo[a,d]cyclohept-11-ene comprising reacting a dibenzosuberone or an aza derivative thereof with an aliphatic ketone in the presence of low valent titanium wherein said low valent titanium is generated by zinc.

17. A process as claimed in claim 1 for preparing Loratadine.

3 A tertiary amine is a compound in which nitrogen is bonded three times to carbon. A commonly used tertiary amine is pyridine.

B. Proceedings to Date

Medichem brought an action under 35 U.S.C. § 291, alleging an interference-in-fact between the '100 and '827 patents, claiming priority of invention, and seeking invalidation of Rolabo's patent under 35 U.S.C. § 102(g). Transcript of Verdict at 653-67, *Medichem, S.A. v. Rolabo, S.L.*, No. 01 Civ. 03087, 2002 U.S. Dist. LEXIS 27086 (S.D.N.Y. May 8, 2002) ("Medichem I"). Because Rolabo was the party with the earlier effective filing date, Medichem sought to establish priority by proving an actual reduction to practice that was even earlier.⁴ After a bench trial, the district [***5] court found that there was no interference-in-fact between the claimed inventions, but it nonetheless awarded priority to Medichem. Id.

4 Rolabo's effective filing date is February 26, 1997 and Medichem's is May 30, 1997.

On appeal, this court vacated the priority holding, opining that because the existence of an interference-in-fact is a jurisdictional requirement under 35 U.S.C. § 291, it was therefore a precondition to the district court's consideration of the priority issue. *Medichem II*, 353 F.3d at 935-36. We explained that the first step in an interference analysis is for the court to determine whether an interference exists under 35 U.S.C. § 291 by asking whether the "patents... have the same or substantially the same subject matter in similar form as that required by the PTO pursuant to 35 U.S.C. § 135." *Id.* at 934 (internal quotations omitted). In order to make this determination, we use the "two-way" test which states that two patents interfere only if (1) invention A either anticipates or renders obvious invention B, where Party A [***6] 's claimed invention is presumed to be prior art vis-a-vis Party B and (2) vice versa. *Id.* (citing *Eli Lilly & Co. v. Bd. of Regents of the Univ. of Wash.*, 334 F.3d 1264, 1268 (Fed. Cir. 2003)).

In *Medichem II*, we held that Medichem's claims to the "species" would clearly anticipate Rolabo's genus claim if the Medichem patent were assumed to be prior art. *Id.* at 934-35. Thus, we held that the first prong of the two-way test was clearly satisfied. *Id.* at 935. However, we remanded to the district court for a determination of

whether the second prong was also satisfied—namely, whether Rolabo's [*1162] genus claim, if prior art, would either anticipate or render obvious Medichem's species claim. *Id.* at 935. We explained that "as the '827 patent contains genus claims and the '100 patent contains species claims, an arrangement that assumes that the '827 patent is prior art does not necessarily anticipate or make obvious the narrower claims of the '100 patent." *Id.*

On remand, the district court held that "assuming arguendo [pursuant to the two-way test] the priority of the '827 patent, claims 1 and 17 of the '827 patent clearly anticipate and render [*7] obvious the adding of a tertiary amine, as in the '100 patent." *Medichem III, 2004 U.S. Dist. LEXIS 23697, 2004 WL 2674632 at *7*. Although the court went on to explain its holding on obviousness grounds, it was silent about the reasons underlying its apparent determination that Rolabo's genus claims would also anticipate Medichem's species claim. Instead, it improperly recharacterized our remand instructions as "reducing to the question of whether it would be 'obvious' to add tertiary amine to a McMurry reaction to make loratadine." ⁵ *Id.* (emphasis added).

5 In so doing, the court appears not to have separately considered the question of whether the '827 patent, if taken as prior art, would anticipate the '100 patent.

The court then correctly stated that:

Determining obviousness requires consideration of two factors: 1) whether the prior art would have suggested to one of ordinary skill in the art that he should carry out the claimed process; and 2) whether the prior art would have also revealed that in carrying out the process, one of ordinary skill would have a reasonable expectation of success.

Id. The district court proceeded to articulate [*8] factual bases for its obviousness holding, which included (1) an article that pointed to the use of amines to improve yields in coupling reactions, (2) testimony by Rolabo's expert about additional such prior art, and (3) evidence that such prior art had actually motivated Medichem's inventor's to try adding tertiary amine to the reaction mixture. *Medichem III, 2004 U.S. Dist. LEXIS 23697, 2004 WL 2674632 at *7-8*.

Having found the two-way test's second prong to be satisfied on both anticipation and obviousness grounds, the district court concluded that the Medichem and Rolabo patents interfered, a finding that gave it jurisdiction over the priority dispute pursuant to 35 U.S.C. § 291. It awarded priority to Medichem, after finding that the invention claimed in the '100 patent was reduced to practice prior to the constructive reduction to practice date of Rolabo's invention. See 2004 U.S. Dist. LEXIS 23697, [WL] at *10-11 (referring to Medichem I and stating that the court "reinstates and reaffirms its former priority ruling").

In finding reduction to practice, the court neither explicitly discussed the legal requirement that reduction to practice be corroborated by independent evidence, [*9] nor made a factual finding of corroboration. However, it dismissed Rolabo's argument that Medichem's inventors were not credible as a result of having fraudulently backdated documents that it had offered to show reduction to practice in 1995. The court thus affirmed its finding in Medichem I that Medichem had provided adequate proof of reduction to practice in 1996. The court did so notwithstanding its previous observation that "the willingness of Medichem to fraudulently backdate [evidence of reduction to practice in 1995], coupled with Medichem's less than punctilious recordkeeping practices . . . does convince the Court that it cannot place the same reliance on plaintiff's testimony and documents as it might otherwise have." Transcript of Verdict at 658, MedichemI. However, the court apparently adhered to [*1163] its view that Medichem's fraudulent backdating was "chiefly a belated attempt to deal with their noncompliance with [certain] regulatory requirements." *Id.* The Medichem III court therefore reaffirmed its award of priority to Medichem, and Rolabo appealed on February 9, 2005. This court has jurisdiction pursuant to 28 U.S.C. § 1295 [*10] (*a*)(1).

As an aside, we wish to note that in parallel with the district court proceedings under 35 U.S.C. § 291, the Board of Patent Appeals and Interferences ("Board") has been considering essentially the same interference and priority issues pursuant to 35 U.S.C. § 135. See *Stampa v. Jackson, 2002 Pat. App. LEXIS 191, 65 U.S.P.Q.2d 1942 (B.P.A.I. 2002)* (involving an interference between Medichem's then-pending reissue application and both Rolabo's patent and a pending continuation application thereof, giving rise to Patent Interference Nos. 105,069 and 105,212). The Board held that the district court's

holding in *Medichem I* did not bar the Board proceedings on grounds of issue preclusion. See *id.* at 1945-47.

Shortly after the district court's remand decision in *Medichem III*, the Board resolved the interference in favor of Rolabo, reaching a conclusion opposite to that of the district court. See *Stampa v. Jackson*, 76 U.S.P.Q.2d (BNA) 1105, *Inter. Nos.* 105,069 & 105,212, 2005 *Pat. App. LEXIS* 12, 2005 WL 596770 (B.P.A.I. January 25, 2005). Central to its decision was *Medichem's* failure to corroborate its account of an alleged actual reduction [*11] to practice with evidence independent of its inventors' testimony. 76 U.S.P.Q.2d (BNA) 1105, 2005 *Pat. App. LEXIS* 12, [WL] at *19-20. The Board noted that "all of the evidence regarding an experiment on May 7, 1996 which is said to have obtained loratadine via a process of the count and conducted by [non-inventor] Lola Casas and said to be recorded [in her notebook] is based on the testimony of [Medichem inventors]." 76 U.S.P.Q.2d (BNA) 1105, 2005 *Pat. App. LEXIS* 12, [WL] at *15. Significantly, *Medichem* did not produce any testimony from Casas, a failure that the Board perceived as sufficient to permit the inference that Casas' testimony would have been adverse to *Medichem*. 76 U.S.P.Q.2d (BNA) 1105, 2005 *Pat. App. LEXIS* 12, [WL] at *20. However, the Board declined to apply such an adverse inference on the grounds that "[Medichem's] case is so weak, we find it unnecessary to draw an inference one way or the other." ⁶ *Id.* While appellant does not argue that the Board decision as a binding effect on this court, Board decisions nevertheless represent the views of a panel of specialists in the area of patent law. *Medichem* has appealed the Board's decision to this court. See *Stampa v. Jackson*, appeal docketed, Nos. 06-1004 & -1029 (Fed. Cir. Oct. 6, 2004 & Oct. 24, 2004).

⁶ A final judgment on the merits was issued the same day. See *Stampa v. Jackson*, 76 U.S.P.Q.2d (BNA) 1105, *Inter. Nos.* 105,069 & 105,212, 2005 *Pat. App. LEXIS* 12, 2005 WL 596770 (B.P.A.I. January 25, 2005). The Board later denied *Medichem's* request for rehearing, stating *inter alia* that "the importance of Lola Casas' testimony is manifest. She is the principal, if not the only, corroborating witness on the issue of whether an actual reduction to practice took place." See *Stampa v. Jackson*, *Inter. Nos.* 105,069 & 105,212, 2006 *Pat. App. LEXIS* 40, 2005 WL 1541082 (B.P.A.I. June 27, 2005).

[*12] DISCUSSION

There are three issues in this case—namely, whether the district court (1) erred in finding the existence of an interference-in-fact; (2) committed reversible error in failing to formally define a count corresponding to the interfering subject matter; and (3) erred in awarding priority of invention to *Medichem* based on the oral testimony of *Medichem* co-inventors, testimony that Rolabo claims was not corroborated by independent evidence, and thus should not have been credited in the final determination of whether reduction to practice was established before the critical date.

[*1164] A. Existence of an Interference-in-Fact

For the reasons explained below, we agree that under the second prong of the two-way test for obviousness, Rolabo's genus claim renders obvious the *Medichem* species claim. We therefore affirm the lower court's finding of an interference-in-fact without needing to review the district court's unsupported factual finding that the second prong of the two-way test was independently satisfied on anticipation grounds.

1. Standard of Review

In reviewing a district court's finding of an interference-in-fact pursuant to the two-way test, this court reviews, where [*13] necessary, both the subsidiary findings of anticipation and/or obviousness as they relate to the application of the test. See *Medichem II*, 353 F.3d at 932 (articulating the standard of review for findings of an interference-in-fact under 35 U.S.C. § 291). Here, because we agree with the district court's subsidiary finding of obviousness, which is sufficient to support its finding of an interference-in-fact, it is not necessary for us to review the court's finding of anticipation.

Obviousness under 35 U.S.C. § 103 is a legal conclusion that is reviewed de novo; however, it is based in turn on underlying factual determinations which are reviewed for clear error. *Id.* Under the clear error standard, a reversal is permitted "only when this court is left with a 'definite and firm conviction' that the district court was in error." *Ruiz v. A.B. Chance Co.*, 357 F.3d 1270, 1275 (Fed. Cir. 2004) (quoting *Amhil Enters. Ltd. v. Wawa, Inc.*, 81 F.3d 1554, 1562 (Fed. Cir. 1996)).

2. Obviousness

The ultimate determination of whether an invention would have been obvious under 35 U.S.C. § 103 [*14] (a) is a legal conclusion based on the factual Graham findings, e.g., "(1) the scope and content of the prior art; (2) the level of ordinary skill in the prior art; and (3) the differences between the claimed invention and the prior art." *Velander v. Garner*, 348 F.3d 1359, 1363 (Fed. Cir. 2003) (citing *Graham v. John Deere Co.*, 383 U.S. 1, 17, 86 S. Ct. 684, 15 L. Ed. 2d 545 (1966)).

This court has held that if all the elements of an invention are found in a combination of prior art references:

a proper analysis under § 103 requires, inter alia, consideration of two factors: (1) whether the prior art would have suggested to those of ordinary skill in the art that they should make the claimed composition or device, or carry out the claimed process; and (2) whether the prior art would also have revealed that in so making or carrying out, those of ordinary skill would have a reasonable expectation of success.

Id.

The first requirement, the motivation to combine references, serves to prevent hindsight bias. See *McGinley v. Franklin Sports, Inc.*, 262 F.3d 1339, 1351 (Fed. Cir. 2001) ("To prevent hindsight invalidation of patent [*15] claims, the law requires some 'teaching, suggestion or reason' to combine cited references.") (quoting *Gambro Lundia AB v. Baxter Healthcare Corp.*, 110 F.3d 1573 (Fed. Cir. 1997)). In making obviousness determinations, the test is "whether the subject matter of the claimed inventions would have been obvious to one skilled in the art at the time the inventions were made, not what would be obvious to a judge after reading the patents in suit and hearing the testimony." *Panduit Corp. v. Dennison Mfg. Co.*, 774 F.2d 1082, 1092 (Fed. Cir. 1985). Whether such a motivation [*1165] has been demonstrated is a question of fact. See *Winner Int'l Royalty Corp. v. Wang*, 202 F.3d 1340, 1348 (Fed. Cir. 2000). Evidence of a motivation to combine prior art references "may flow from the prior art references themselves, the knowledge of one of ordinary skill in the art, or, in some cases, from the nature of the problem to

be solved." *Brown & Williamson Tobacco Corp. v. Philip Morris Inc.*, 229 F.3d 1120, 1125 (Fed. Cir. 2000).

When a piece of prior art "suggests that the line of development flowing from the reference's disclosure is unlikely [*16] to be productive of the result sought by the applicant" the piece of prior art is said to "teach away" from the claimed invention. *In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994). As with other subsidiary obviousness inquiries, "what a reference teaches and whether it teaches toward or away from the claimed invention are questions of fact." *Winner*, 202 F.3d at 1349 (internal quotations omitted). However, obviousness must be determined in light of all the facts, and there is no rule that a single reference that teaches away will mandate a finding of nonobviousness. Likewise, a given course of action often has simultaneous advantages and disadvantages, and this does not necessarily obviate motivation to combine. See *id.* at 1349 n.8 ("The fact that the motivating benefit comes at the expense of another benefit, however, should not nullify its use as a basis to modify the disclosure of one reference with the teachings of another. Instead, the benefits, both lost and gained, should be weighed against one another."). Where the prior art contains "apparently conflicting" teachings (i.e., where some references teach the combination and others [*17] teach away from it) each reference must be considered "for its power to suggest solutions to an artisan of ordinary skill. . . . considering the degree to which one reference might accurately discredit another." *In re Young*, 927 F.2d 588, 591 (Fed. Cir. 1991).

As stated above, an obviousness determination requires not only the existence of a motivation to combine elements from different prior art references, but also that a skilled artisan would have perceived a reasonable expectation of success in making the invention via that combination. While the definition of "reasonable expectation" is somewhat vague, our case law makes clear that it does not require a certainty of success. See *In re O'Farrell*, 853 F.2d 894, 903-04 (Fed. Cir. 1988) ("Obviousness does not require absolute predictability of success. . . . All that is required is a reasonable expectation of success.").

However, to have a reasonable expectation of success, one must be motivated to do more than merely to "vary all parameters or try each of numerous possible choices until one possibly arrived at a successful result,

where the prior art gave either no indication of which parameters [**18] were critical or no direction as to which of many possible choices is likely to be successful." *Id.* at 903. Similarly, prior art fails to provide the requisite "reasonable expectation" of success where it teaches merely to pursue a "general approach that seemed to be a promising field of experimentation, where the prior art gave only general guidance as to the particular form of the claimed invention or how to achieve it." *Id.*

The district court's finding of a reasonable expectation of success is a question of fact, which we review for clear error. See *Ruiz*, 357 F.3d at 1275 (explaining that the obviousness determination rests on "various factual findings that this court reviews for clear error following a bench trial"); *Brown & Williamson*, 229 F.3d at 1129 [*1166] (reviewing the district court's finding of reasonable expectation of success under the clear error standard); see also *Velander v. Garner*, 348 F.3d 1359, 1376 (*Fed. Cir.* 2003) (reviewing the Board of Patent Appeals and Interferences' finding of a reasonable expectation of success under a "substantial evidence" standard).

3. Analysis

Rolabo argues that the [**19] district court erred in finding that the Medichem invention (which uses a tertiary amine) would have been obvious over the broader Rolabo invention (which does not require it). Specifically, it appears to argue both that the prior art contained no motivation to combine references so as to have encouraged one reasonably skilled in the art to have added a tertiary amine to a McMurry reaction and that an artisan, even if motivated to add a tertiary amine to Rolabo's process, would have had no reasonable expectation of succeeding in making loratadine via a McMurry reaction in the presence of a tertiary amine.

In support of its arguments, Rolabo cites the trial testimony of an expert witness who explained that a seminal review article in the field showed that a tertiary amine could have "a positive effect, a negative effect, and in some cases, both a positive and negative effect" on the McMurry reaction. Rolabo goes on to cite prior art references that disclose negative effects and essentially argues that the existence of prior art references that teach away from the invention clearly negates the motivation to combine and that the district court's finding of motivation was clearly erroneous. [**20] We disagree.

Granted, it is clear that the prior art disclosed not only potential advantages of using a tertiary amine in a McMurry reaction but also potential disadvantages. On the one hand, some pieces of prior art taught that low concentrations of a tertiary amine could sometimes be used to improve the yield of reactions or to avoid the formation of undesirable rearranged products. On the other hand, other references reported that tertiary amines could sometimes promote the formation of undesirable diol side-products and that when they were used as the reaction solvent (i.e., when tertiary amines are present at their highest possible concentrations), they could stop the reaction completely.

We also note the ambivalence of Medichem co-inventor Dr. Onrubia toward the introduction of a tertiary amine to the reaction mixture. On the one hand, she testified that she had added a tertiary amine "because the literature said that it might be possible to use tertiary amines in the reaction, that it wouldn't interfere, that it wasn't incompatible, and it's habitual in these circumstances to try various options until you get the reaction to work." On the other hand, when asked, "Is this purely [**21] hit or miss or is there some logical cause . . . for believing that tertiary amine would add something?" she responded: "Frankly, as an organic chemist I have no reason to say that there were grounds for expecting anything from the addition of tertiary amine."

As we have explained above, the fact that some teachings in the prior art conflict with others does not render the findings of the district court clearly erroneous per se. Rather, the prior art must be considered as a whole for what it teaches. We understand the prior art, viewed as a whole, to teach that the addition of a tertiary amine sometimes works to improve the yield of McMurry reactions, especially when a tertiary amine is used in relatively low concentrations. In light of this, we cannot say that the district court clearly erred in finding that the prior art would have provided the skilled artisan with a [*1167] motivation to combine references so as to use pyridine in the McMurry reaction. We wish to emphasize that this is not a case where the prior art's lack of definiteness or certainty about the result of using a tertiary amine in a specific reaction system renders the inventive subject matter "obvious to [**22] try" but not obvious. While we have made clear that "obvious to try" is not the standard under § 103, . . . the meaning of this maxim is sometimes lost." *In re O'Farrell*, 853 F.2d 894,

903 (Fed. Cir. 1988). In O'Farrell, we opined that:

[This] admonition . . . has been directed mainly at two kinds of error[, namely where] . . . what would have been "obvious to try" would have been . . . to vary all parameters or try each of numerous possible choices . . . where the prior art gave . . . no direction as to which of many possible choices is likely to be successful[or] . . . to explore . . . a promising field of experimentation, where the prior art gave only general guidance . . .

Id. (citations omitted). In the instant case there are not numerous parameters to vary. Rather, the principal parameter is the concentration of tertiary amine that should be used, and the prior art teaches that if the tertiary amine were to have any positive effect at all, it would be when it was present at low concentrations. Likewise, this is not a case where the prior art gives merely general guidance. In contrast, the guidance is quite clear—namely, that [**23] McMurry reactions of this kind can sometimes be optimized by adding low levels of a tertiary amine.

For the aforementioned reasons, we find no clear error in the district court's determination that skilled artisans in possession of the Rolabo patent and the prior art would have not only been motivated to add a tertiary amine but that they would have possessed a reasonable expectation that they would succeed in optimizing the reaction. Reviewing *de novo* the trial court's application of these factual findings to reach the legal conclusion of obviousness, we likewise find no error. Accordingly, we agree with the district court's determination that the addition of a tertiary amine to a McMurry reaction would have been obvious in view of the Rolabo patent and the prior art. Because this obviousness finding satisfies the second prong of the two-way test for an interference-in-fact, we affirm the district court's determination that an interference-in-fact existed.

As a final matter, we note that we find no merit in Rolabo's contention that we should exclude from the subject matter of the interference that portion of its invention that is directed to running reactions where titanium [**24] is present in specific concentration ranges (claims 10 and 11 of the '827 *patent*). Claim 10

requires a relative titanium concentration of 1.5:1 to 4:1, and claim 11 requires a ratio of 2:1 to 3:1. The district court relied on the testimony of Medichem's expert witness, Dr. Finney, in holding that all of the various claims of the '827 *patent* were "essentially identical to one another and substantially the same as claim 2 of Medichem's patent." See *Medichem III*, 2004 U.S. Dist. LEXIS 23697, 2004 WL 2674632 at *4. Rolabo argues that Finney's expert testimony was "conclusory" and therefore insufficient to establish an interference. However, it is clear from the record that Finney's testimony was far from conclusory. In fact, Finney provided a solid factual basis for his opinion, stating that

"claim 10 says that you should have between, a ratio of one and a half to 4 to 1 titanium to dibenzosuberone. Claim 11 states the range should be 2 to 1 to 3 to 1. These are both perfectly normal ranges. And in fact, the patent examples in the '827 [Rolabo's] patent specify I think about a 2.2 to 1 ratio. . . ."

[*1168] Indeed, other evidence of record also supports the conclusion that these are normal [**25] ranges. The Banerji reference discloses ratios of 2:1 and 1:1; Ishida discloses ratios of 1.5:1, 2.5:1 and 5:1; and Lenoir discloses a ratio of about 1:1.

In short, it is clear that Rolabo's claims 10 and 11 are directed to titanium ratios that are entirely within the range of the prior art, and this fact is dispositive. This court has held that "selecting a narrow range from within a somewhat broader range disclosed in a prior art reference is no less obvious than identifying a range that simply overlaps a disclosed range." *In re Peterson*, 315 F.3d 1325, 1330 (Fed. Cir. 2003). Moreover, when "the claimed ranges are completely encompassed by the prior art, the conclusion is even more compelling than in cases of mere overlap." *Id.* We have explained that the "normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages." *Id.* Therefore, because Rolabo's claims 10 and 11 are directed to ratios that are entirely within the prior art, the district court properly held those claims to be part of the interfering subject [**26] matter pursuant to the two-way test.

B. Identification of Interfering Subject Matter

Having affirmed the district court's determination that an interference-in-fact exists, and that it properly includes those claims directed to specific titanium ratios, this court turns to address Rolabo's procedural argument that the district court erred when it failed to comply with the Board's practice of articulating a precise count of the interference prior to making priority determinations.

This court has not yet addressed "whether district courts handling interfering patent suits under § 291 must define this interfering subject matter in a way similar to a count." *Slip Track Sys., Inc. v. Metal-Lite, Inc.*, 304 F.3d 1256, 1264 (Fed. Cir. 2002). Nevertheless, we have made clear that at least "a single description of the interfering subject matter is necessary for a determination of priority." *Id.*

That said, *SlipTrack* does not require a court to refer explicitly to the interfering subject matter as a "count," and we believe that in this case the district court was clear about the identity of the interfering subject matter, stating in its opinion "all the various claims [*27] of the '827 patent are essentially identical to one another and substantially the same as claim 2 of Medicchem's patent." *Medicchem III*, 2004 U.S. Dist. LEXIS 23697, 2004 WL 2674632 at *4. Moreover, to the extent that the district court may not have been clear about whether the tertiary amine limitation was part of the interfering subject matter, we can resolve this issue on appeal. See *Slip Track*, 304 F.3d at 1264-65 (holding that where "the parties . . . dispute only whether one limitation is part of the interfering subject matter, and determination of this issue is dependent upon issues of law alone, we will resolve this issue on appeal.") Accordingly, we hold that the interfering subject matter in this case does not include the limitation of the tertiary amine, and corresponds to claim 17 of Rolabo's '827 patent. See *id.* 1265 ("Since the claims of the '760 patent do not include a wallboard . . . the wallboard cannot be an element of the interfering subject matter in this case, even though it is a limitation in the claims of the '203 patent."). ⁷

⁷ We note that in parallel interference proceedings, pursuant to 35 U.S.C. § 135, the Board reached a similar definition of the count. See *Stampa v. Jackson*, 2002 Pat. App. LEXIS 191, 65 U.S.P.Q.2d 1942, 1948 (B.P.A.I. 2002) (defining the count as Jackson's (Rolabo's) claim 17).

Finally, we review the district court's award of priority of invention to Medicchem. Because the Medicchem '100 patent issued from an application that had a later effective filing date than did Rolabo's '827 patent application, see *supra* note 4, Medicchem bears the burden of establishing priority by a preponderance of the evidence. See *Eli Lilly & Co. v. Aradigm Corp.*, 376 F.3d 1352, 1365 (Fed. Cir. 2004) ("Under 35 U.S.C. § 291, a party that does not have the earliest effective filing date needs only to demonstrate by a preponderance of the evidence that it was the first to invent if the two patents or applications at issue were co-pending before the PTO . . ."). Medicchem bears no heightened burden, because neither patent enjoys a statutory presumption of validity. See *id.* ("The presumption of validity is nonexistent and the preponderance of the evidence burden is appropriate even if both of the patents have issued by the time a section 291 interference proceeding is initiated in a district court.").

We have held that "priority of invention goes to the first party to reduce an invention to practice unless the [*29] other party can show that it was the first to conceive of the invention and that it exercised reasonable diligence in later reducing that invention to practice." *Cooper v. Goldfarb*, 154 F.3d 1321, 1327 (Fed. Cir. 1998). Here, because neither party relied on a date of conception, priority is properly awarded to the party that was the first to reduce its invention to practice, either actually or constructively. Rolabo relies on its date of constructive reduction to practice, namely its February 26, 1997 effective filing date. Medicchem, on the other hand, alleges that it achieved an actual reduction to practice in the spring of 1996, a date which if proven would antecede Rolabo's filing date, and thereby entitle it to priority. See *supra* note 4 (effective filing dates).

In order to establish an actual reduction to practice, Medicchem must establish three things: "(1) construction of an embodiment or performance of a process that met all the limitations of the interference count; (2) . . . determination that the invention would work for its intended purpose," *Cooper*, 154 F.3d at 1327; and (3) the existence of sufficient evidence to corroborate [*30] inventor testimony regarding these events, see *id.* at 1330 ("In order to establish an actual reduction to practice, an inventor's testimony must be corroborated by independent evidence."). The key issue on appeal is the last one, namely whether Medicchem provided adequate corroboration of the inventors' testimony regarding the

[**28] [*1169] C. Priority of Invention

alleged actual reduction to practice.

For purposes of conceptual clarity, as well as clarity of language, it should be noted that no similar condition of "corroboration" is imposed on an inventor's notebook, or indeed on any documentary or physical evidence, as a condition for its serving as evidence of reduction to practice. See, e.g., *Mahurkar v. C.R. Bard, Inc.*, 79 F.3d 1572, 1577-78 (Fed. Cir. 1996) (explaining that "this court does not require corroboration where a party seeks to prove conception through the use of physical exhibits because the trier of fact can conclude for itself what documents show, aided by testimony as to what the exhibit would mean to one skilled in the art"); *Price v. Symsek*, 988 F.2d 1187, 1195 (Fed. Cir. 1993) ("Only the inventor's testimony requires corroboration [*1170] before it [*31] can be considered."). Of course, the credibility (and therefore the corroborative value) of an inventor's notebook may vary. Nevertheless, a notebook, unlike the oral testimony of an inventor, may be weighed, for whatever it is worth, in the final determination of reduction to practice. However, in a case involving reduction to practice, an unwitnessed notebook is insufficient on its own to support a claim of reduction to practice. See *Reese v. Hurst*, 661 F.2d 1222, 1232 (CCPA 1981) ("The inventors' notebooks are accorded no more weight than the inventors' testimony in this instance, since they were not witnessed or signed and were unseen by any witness until after this interference was declared."); *Hahn v. Wong*, 892 F.2d 1028, 1033 (Fed. Cir. 1989) (stating that "affiants' statements that by a certain date they had 'read and understood' specified pages of Stephen Hahn's laboratory notebooks did not corroborate a reduction to practice . . . because they established only that those pages existed on a certain date . . . [and] did not independently corroborate the statements made on those pages"); *Singh v. Brake*, 222 F.3d 1362, 1370 (Fed. Cir. 2000) [*32] (stating that Hahn v. Wong did not nullify the value of laboratory notebooks in corroborating conception because "the standard of proof required to corroborate a reduction to practice [is] more stringent . . . than that required to corroborate a conception.").⁸ Once properly admitted into evidence, documentary and physical evidence is assigned probative value and collectively weighed to determine whether reduction to practice has been achieved. This is what is meant by the maxim that documentary and physical evidence do not require "corroboration."

8 Cf. *Stern v. Trs. of Columbia Univ.*, 434 F.3d 1375, 2006 U.S. App. LEXIS 1015, No. 05-1291, slip op. at 5 (Fed. Cir. Jan. 17, 2006) ("Regardless of the contents of the notebooks, unwitnessed laboratory notebooks on their own are insufficient to support his claim [of conception, and therefore] of co-inventorship.").

1. Corroboration

Credibility concerns undergird the corroboration requirement, the purpose of which is to prevent fraud. See *Chen v. Bouchard*, 347 F.3d 1299, 1309 (Fed. Cir. 2003) ("The purpose of corroboration . . . is to prevent fraud, by providing independent confirmation of the inventor's testimony.") (internal [*33] quotations omitted). As such, the corroboration requirement provides an additional safeguard against courts being deceived by inventors who may be tempted to mischaracterize the events of the past through their testimony. See *Mahurkar*, 79 F.3d at 1577 ("While perhaps prophylactic in application given the unique abilities of trial court judges and juries to assess credibility, the rule provides a bright line for both district courts and the PTO to follow in addressing the difficult issues related to invention dates.").

Sufficiency of corroboration is determined by using a "rule of reason" analysis, under which all pertinent evidence is examined when determining the credibility of an inventor's testimony. See *Price v. Symsek*, 988 F.2d 1187, 1195 (Fed. Cir. 1993) ("A rule of reason analysis is applied to determine whether the inventor's prior conception testimony has been corroborated."); *Berges v. Gottstein*, 618 F.2d 771, 776 (CCPA 1980) ("In the final analysis, each corroboration case must be decided on its own facts with a view to deciding whether the evidence as a whole is persuasive.").

The requirement of independent knowledge [*34] remains key to the corroboration inquiry. See *Reese v. Hurst*, 661 F.2d 1222, 1225 (CCPA 1981) ("Adoption of the 'rule of reason' has not altered the [*1171] requirement that evidence of corroboration must not depend solely on the inventor himself."). "Independent corroboration may consist of testimony of a witness, other than the inventor, to the actual reduction to practice or it may consist of evidence of surrounding facts and circumstances independent of information received from the inventor." *Id.* One consequence of the independence requirement is that testimony of one co-inventor cannot

be used to help corroborate the testimony of another. See, e.g., *Lacks Indus. v. McKechnie Vehicle Components USA, Inc.*, 322 F.3d 1335, 1350 (Fed. Cir. 2003) (opining that the Special Master rightly refused to accept cross-corroboration of oral testimony as being adequate).

Despite the importance of the independence requirement, however, "the law does not impose an impossible standard of 'independence' on corroborative evidence by requiring that every point of a reduction to practice be corroborated by evidence having a source totally independent of the inventor. [*35] . . ." *Cooper v. Goldfarb*, 154 F.3d at 1330 (internal quotations omitted). Similarly, "it is not necessary to produce an actual over-the-shoulder observer. Rather, sufficient circumstantial evidence of an independent nature can satisfy the corroboration requirement." *Id.*

When an inventor claims a process for making a chemical compound rather than the compound itself, it is the successful reduction to practice of the process that must be corroborated, and not merely the successful production of the compound *per se*. Thus, spectral evidence that might be sufficient *per se* to corroborate a claim directed to the product will generally not be sufficient to corroborate a claim directed to the process, in the absence of some evidence to corroborate that the product was produced via that process.

2. Standard of Review

Whether or not corroboration exists is a question of fact, the district court's determination of which we review for clear error. This is true because "issues of conception and reduction to practice are questions of law predicated on subsidiary factual findings," *Eaton v. Evans*, 204 F.3d 1094, 1097 (Fed. Cir. 2000), and corroboration [*36] is properly viewed as a subsidiary factual finding. See *Singh v. Brake*, 222 F.3d at 1368 (implying that corroboration is a question of fact by holding that "substantial evidence supports the Board's finding that this notebook entry alone was insufficient to corroborate Singh's testimony . . .") (emphasis added).

Before reviewing the determination of the court below, we note that it is true that corroboration is fundamentally about "credibility," see *supra* Discussion, Part C.1, and that in reviewing factual findings under the clear error standard, this court "gives great deference to the district court's decisions regarding credibility of witnesses." See *Ecolchem, Inc. v. S. Cal. Edison Co.*,

227 F.3d 1361, 1378-79 (Fed. Cir. 2000) (internal quotations omitted). Indeed, such deference is appropriately accorded to assessments of witness credibility because "only the trial judge can be aware of the variations in demeanor and tone of voice that bear so heavily on the listener's understanding of and belief in what is said." *Anderson v. Bessemer City*, 470 U.S. 564, 575, 105 S. Ct. 1504, 84 L. Ed. 2d 518 (1985).

Nonetheless, such deference is often [*37] of little consequence in a corroboration inquiry because the *raison d'être* of the corroboration requirement is our refusal to base priority determinations on a court's uncorroborated assessments of a testifying inventor's credibility. Even the most credible inventor testimony is a *fortiori* required to be corroborated by independent [*1172] evidence, which may consist of documentary evidence as well as the testimony of non-inventors. To the extent that a district court's finding of corroboration rests on its assessment of the credibility of non-inventor testimony, we apply the deferential standard of review stated in *Ecolchem*. To the extent that it rests, as it does here, on the district court's assessment of documentary, as opposed to testimonial evidence, we still apply clear error review; however, clear error is less difficult to establish.

3. Analysis

The parties in this case dispute whether or not there was adequate corroboration of the inventors' testimony that *Medichem* had actually reduced to practice the process of the claimed invention before *Robalo's* effective filing date. *Medichem* put forward two principal types of corroborating evidence: documentary evidence generated [*38] by inventors and that generated by non-inventors.⁹

9 This patent bore a number of co-inventors, many of whom testified at trial. As we have noted above, the testimony of one inventor cannot be corroborated by the testimony of co-inventors.

In the first category, it produced a documented request for the analysis of a sample, purported to have been produced via the claimed synthetic route, which was sent by one co-inventor to another. Also in this category were the NMR spectral data obtained by the co-inventor pursuant to that request. These spectra were consistent with loratadine, and the accuracy of that chemical identification is not being challenged. Finally, this category includes the original laboratory notebook of

co-inventor Dr. Rodriguez. In the second category, documentary evidence by non-inventors, there is the original laboratory notebook of former Medichem employee, and non-inventor, Lola Casas.

This court now turns to consider the corroborative value of the three principal pieces of potentially corroborative evidence: the NMR spectra, the notebooks of Medichem's inventors, and the notebook of non-inventor Casas. We note at the outset that the [**39] problem with the dated NMR data is that at most they corroborate that the inventors were in possession of the chemical loratadine as of that date; they do not, in themselves, adequately corroborate the claimed process, as they do not establish whether the sample that was analyzed was actually produced by that process. If this case dealt with a claim to a composition of matter, rather than to a process, the NMR evidence might very well take on a different relevance in this regard. As far as the corroborative value of the inventors' notebooks is concerned, they were not witnessed, and they do not provide an "independent" source of authority on the issue of reduction to practice. Hence, they have minimum corroborative value.

It is clear to this court, therefore, that Medichem's claim of corroboration stands or falls with the modicum of additional corroborative value that can properly be assigned to non-inventor Casas' notebook.¹⁰ However, Casas did not testify [**1173] regarding the notebook or the genuineness of its contents. In addition, although Casas' notebook was dated, it was neither signed nor witnessed, and inventor Rodriguez testified that she and Casas had made entries in each [**40] others' notebooks. Rodriguez characterized these occasions as not out of the ordinary. As a result, the district court was clearly reliant on the inventor to help to identify the author of specific entries made in Casas' notebook, because in a reduction to practice inquiry, only those passages of the unsigned, unwitnessed notebooks authored by non-inventor Casas could possess significant corroborative value. In addition, without testimony from Casas, the court lacked any non-inventor testimony regarding the genuineness of the notebook's contents.

10 When an inventor attempts to offer into evidence the notebook of a non-inventor as evidence of corroboration, evidentiary issues might be implicated. For example, the notebook is likely to be hearsay, and if so, there may be an

issue as to whether or not it falls within an exception to the hearsay rule, such as the business record exception. Indeed, in *Chen v. Bouchard*, this court affirmed the decision of the Board of Patent Appeals and Interferences to exclude as inadmissible hearsay a non-inventor's notebooks, which had been offered to corroborate reduction to practice where, as in the instant case, the non-inventor did not testify. 347 F.3d 1299, 1308 (Fed. Cir. 2003).

[**41] We also note that Medichem admitted fraudulently backdating certain documents relating to a purported 1995 reduction to practice. Even though the backdating of the 1995 documents was unrelated to the critical pages in Casas' notebook, which purport to establish a reduction to practice in 1996, the district court found that the credibility of the Medichem inventors was accordingly diminished.

Where a laboratory notebook authored by a non-inventor is offered into evidence pursuant to authentication by an inventor, where the author of the notebook has not testified at trial or otherwise attested to its authenticity, and where the notebook has not been signed or witnessed and has not been maintained in reasonable accordance with good laboratory practices sufficient to reasonably ensure its genuineness under the circumstances, then the corroborative value of the notebook is minimal. Given the facts of this case, Casas' notebook should therefore not be accorded much corroborative value. In view of the minimal corroborative value of the inventors' notebooks and the limited value of the NMR spectrum, we conclude that the evidence, evaluated as a whole under the rule of reason, is [**42] insufficient as a matter of law to corroborate Medichem's reduction to practice.

The district court did not specifically address corroboration in its obviousness inquiry, a fact that might, in some circumstances, hamper our ability to conduct clear error review. Here, however, the facts of the case admit of only one conclusion as a matter of law, and we therefore decide the case without remanding to the district court for an explanation of why it implicitly found corroboration to be present. We hold that corroboration is absent and that the district court therefore erred in reaching its legal conclusion that Medichem had reduced its invention to practice in the spring of 1996. Accordingly, we reverse the district

437 F.3d 1157, *1173; 2006 U.S. App. LEXIS 2653, **42;
77 U.S.P.Q.2D (BNA) 1865

court's award of priority to Medichem.

No costs.

AFFIRMED-IN-PART, REVERSED-IN-PART

LEXSEE 425 U.S. 273

SAKRAIDA v. AG PRO, INC.

No. 75-110

SUPREME COURT OF THE UNITED STATES

425 U.S. 273; 96 S. Ct. 1532; 47 L. Ed. 2d 784; 1976 U.S. LEXIS 146; 189 U.S.P.Q.
(BNA) 449

Argued March 3, 1976
April 20, 1976

PRIOR HISTORY: CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE FIFTH CIRCUIT

determination of patent validity and holding that the record did not support the grant of a new trial (5/2 F2d 141).

SUMMARY:

An action was instituted in the United States District Court for the Western District of Texas for alleged infringement of the plaintiff's combination patent covering a water flush system to remove cow manure from the floor of a dairy barn. All of the individual elements of the combination patent were old in the dairy business, and the only claimed inventive feature was the provision for abrupt release of water from storage tanks or pools directly onto the barn floor to cause the flow of a sheet of water washing all animal waste into drains within minutes without supplemental hand labor as was required under the prior art. After the District Court's initial grant of summary judgment for the defendant had been reversed by the *United States Court of Appeals for the Fifth Circuit* (437 F2d 99), the District Court, upon trial on remand, entered judgment for the defendant on the ground that the patent was invalid for obviousness under 103 of the Patent Act (35 USCS 103), which provides that a patent may not be obtained if the subject matter would have been obvious at the time the invention was made to a person having ordinary skill in the applicable art. The Court of Appeals again reversed and held the patent valid (474 F2d 167), and on rehearing, remanded the case for entry of a judgment holding the patent valid, unless the defendant established a case for a new trial on the basis of newly discovered evidence (481 F2d 668). The District Court ordered a new trial, but the Court of Appeals again reversed, reaffirming its prior

On certiorari, the United States Supreme Court reversed. In an opinion by Brennan, J., expressing the unanimous view of the court, it was held that the plaintiff's patent was invalid for obviousness under 103 of the Patent Act, since all of the individual elements of the patent were old in the dairy business and the combination of the old elements to produce an abrupt release of water directly onto the barn floor did not result in a new or different function or an effect greater than the sum of the several effects taken separately, the combination of old elements thus falling under the head of the work of a skillful mechanic, not that of an inventor.

LAWYERS' EDITION HEADNOTES:

[***LEDHN1]

PATENTS §40

validity -- dairy barn flush system -- obviousness --

Headnote:[1A][1B][1C][1D]

A combination patent covering a water flush system to remove cow manure from the floor of a dairy barn--the only claimed inventive feature being the provision for abrupt release of water from storage tanks or pools directly onto the barn floor to cause the flow of a sheet of water washing animal waste into drains within minutes without supplemental hand labor as was required under prior art--is invalid for obviousness under 103 of the Patent Act (35 USCS 103) even though it produces a

desired result in a more convenient, cheaper, and faster way than under the prior art, and even though it enjoys commercial success, where (1) all of the individual elements of the combination were old in the dairy business, and (2) the combination of the old elements to produce an abrupt release of water directly onto the barn floor did not result in a new or different function or an effect greater than the sum of the several effects taken separately, and fell under the head of the work of a skillful mechanic, not that of an inventor.

[***LEdHN2]

PATENTS §17

necessity for invention -- mechanical skill --

Headnote:[2]

The Constitution requires that there be some "invention" to be entitled to patent protection; unless more ingenuity and skill are required than are possessed by an ordinary mechanic acquainted with the business, there is an absence of that degree of skill and ingenuity which constitute essential elements of every invention.

[***LEdHN3]

PATENTS §19.1

TRIAL §154

patent validity -- obviousness --

Headnote:[3]

The ultimate test of patent validity is one of law, but resolution of the issue of obviousness under 103 of the Patent Act (35 USCS 103)--which provides that a patent may not be obtained if the subject matter would have been obvious at the time the invention was made to a person having ordinary skill in the applicable art--necessarily entails basic factual inquiries to determine (1) the scope and content of the prior art, (2) the differences between the prior art and the claims at issue, and (3) the level of ordinary skill in the pertinent art.

[***LEdHN4]

EVIDENCE §1002

sufficiency -- patent --

Headnote:[4]

In an action for alleged infringement of a combination patent covering a water flush system to remove cow manure from the floor of a dairy barn, the evidence is sufficient to support the Federal District Court's finding that each of the component parts of the patent were old and well-known throughout the dairy industry prior to the date of the filing of the application for the patent in question, where the scope of the prior art is shown by prior patents, prior art publications, affidavits of people having knowledge of prior flush systems analogous to the patent in question, and the testimony of a dairy operator with 22 years experience who described flush systems he had seen on visits to dairy farms throughout the country.

[***LEdHN5]

PATENTS §40

aggregation of old elements --

Headnote:[5]

Courts should scrutinize combination patent claims with a care proportioned to the difficulty and improbability of finding invention in an assembly of old elements.

[***LEdHN6]

PATENTS §40

aggregation of old elements --

Headnote:[6]

A combination arranging old elements with each performing the same function it had been known to perform, although perhaps producing a more striking result than in previous combinations, is not patentable under standards appropriate for a combination patent.

[***LEdHN7]

PATENTS §17

necessity of invention -- commercial success --

Headnote:[7]

Benefits in producing a desired result in a more

convenient, cheaper, and faster way than under the prior art, and commercial success, will not, without invention, make patentability.

SYLLABUS

Respondent's patent covering a water flush system to remove cow manure from the floor of a dairy barn held invalid for obviousness, it being a combination patent all the elements of which are old in the dairy business and were well known before the filing of the patent application. The system's exploitation of the principle of gravity to effect the abrupt release of water "did not produce a 'new or different function'... within the test of validity of combination patents." *Anderson's-Black Rock v. Pavement Co.*, 396 U.S. 57, 60. Pp. 274-283.1

512 F. 2d 141, reversed.

BRENNAN, J., delivered the opinion for a unanimous Court.

COUNSEL: *Stephen B. Tatem, Jr.*, argued the cause for petitioner. With him on the briefs was *James F. Hulse*.

J. Pierre Kolisch argued the cause for respondent. With him on the brief was *John W. Stuart*. *

* *Mary Helen Sears* filed a brief for the Texas Farmers Union as *amicus curiae* urging reversal.

Helen W. Nies, *Donald R. Dunner*, and *David N. Webster* filed a brief for the Bar Association of the District of Columbia as *amicus curiae*.

JUDGES: BURGER, BRENNAN, STEWART, WHITE, MARSHALL, BLACKMUN, POWELL, REHNQUIST, and STEVENS.

OPINION BY: BRENNAN

OPINION

[*273] [***786] [**1533] MR. JUSTICE BRENNAN delivered the opinion of the Court.

Respondent Ag Pro, Inc., filed this action against petitioner Sakraida on October 8, 1968, in the District Court for the Western District of [***787] Texas for

infringement of United States Letters Patent 3,223,070, entitled "Dairy [*274] Establishment," covering a water flush system to remove cow manure from the floor of a dairy barn. The patent was issued December 14, 1965, to Gribble and Bennett, who later assigned it to respondent.

***[LEdHR1A] [1A]The District Court's initial grant of summary judgment for petitioner was reversed by the Court of Appeals for the Fifth Circuit. 437 F. 2d 99 (1971). After a trial on remand, the District Court again entered a judgment for petitioner. The District Court held that the patent "does not constitute invention, is not patentable, and is not a valid patent, it being a combination patent, all of the elements of which are old in the dairy business, long prior to 1963, and [**1534] the combination of them as described in the said patent being neither new nor meeting the test of non-obviousness." The Court of Appeals again reversed and held the patent valid. 474 F. 2d 167 (1973). On rehearing, the court remanded "with directions to enter a judgment holding the patent valid, subject, however, to... consideration of a motion under Rule 60 (b)(2), F.R. Civ. P., to be filed in the District Court by the [petitioner] Sakraida on the issue of patent validity based on newly discovered evidence." 481 F. 2d 668, 669 (1973). The District Court granted the motion and ordered a new trial. The Court of Appeals again reversed, holding that the grant of the motion was error, because "the record on the motion establishes that [petitioner] failed to exercise due diligence to discover the new evidence prior to entry of the former judgment." 512 F. 2d 141, 142 (1975). The Court of Appeals further held that "[o]ur prior determination of patent validity is reaffirmed." *Id.*, at 144. We granted certiorari. 423 U.S. 891 (1975). We hold that the Court of Appeals erred in holding the patent valid and also in reaffirming its determination of patent validity. We therefore reverse and direct the reinstatement of the District [*275] Court's judgment for petitioner, and thus we have no occasion to decide whether the Court of Appeals properly found that petitioner had not established a case for a new trial under Rule 60 (b)(2).

Systems using flowing water to clean animal wastes from barn floors have been familiar on dairy farms since ancient times. ¹ The District Court found, and respondent concedes, that none of the 13 elements of the Dairy Establishment combination is new, ² [***788] and many of those [*276] elements, including [**1535] storage of the water in tanks or pools, appear in at least

six prior patented systems. ³ The prior art involved spot delivery of water from tanks or pools [¶277] to the barn floor by means of high pressure hoses or pipes. That system required supplemental hand labor, using tractor blades, shovels, and brooms, and cleaning by these methods took several hours. The only claimed inventive feature of the Dairy Establishment combination of old elements is the provision for abrupt release of the water from the tanks or pools directly onto the barn floor, which causes the flow of a sheet of water that washes all animal waste into drains within minutes and requires no supplemental hand labor. As an expert witness for respondent testified concerning the effect of Dairy Establishment's combination: "[W]ater at the bottom has more friction than this water on the top and it keeps moving ahead and as this water keeps moving ahead we get a rolling action of this water which produced the cleaning action.... You do not get this in a hose.... [U]nless that water is continuously directed toward the cleaning area the cleaning action almost ceases instantaneously...." ⁴

1 Among the labors of Hercules is the following:

"Heracles now set out to perform his fifth Labour, and this time his task was to cleanse the stables of Augeas in a single day. Augeas was a rich king of Elis, who had three thousand cattle. At night the cattle always stood in a great court surrounded with walls, close to the king's palace, and as it was quite ten years since the servants had cleaned it out, there was enough refuse in the court to build up a high mountain. Heracles went to Augeas and asked if he would give him the tenth part of his flocks if he thoroughly cleansed his stables in a single day. The king looked upon this as such an absolutely impossible feat that he would not have minded promising his kingdom as a reward for it, so he laughed and said, 'Set to work, we shall not quarrel about the wages,' and he further promised distinctly to give Heracles what he asked, and this he did in the presence of Phyleus, his eldest son, who happened to be there. The next morning Heracles set to work, but even his strong arms would have failed to accomplish the task if they had not been aided by his mother-wit. He compelled a mighty torrent to work for him, but you would hardly guess how he did it. First he opened great gates on two opposite sides of the court, and then he went to the stream,

and when he had blocked up its regular course with great stones, he conducted it to the court that required to be cleansed, so that the water streamed in at one end and streamed out at the other, carrying away all the dirt with it. Before evening the stream had done its work and was restored to its usual course." C. Witt, *Classic Mythology* 119-120 (1883).

2 The District Court found as follows respecting Claims 1 and 3, the only claims involved in the case:

"1. I find that the 'dairy establishment' as described in United States Letters Patent 3,223,070 is composed of 13 separate items, as follows:

"(a) '... a smooth, evenly contoured, paved surface forming a floor providing a walking surface....'

"(b) '... drain means for draining wash water from such floor opening to the top of the floor.'

"(c) '... said smooth, evenly contoured surface which forms such floor sloping toward said drain....'

"(d) '... multiple rest areas with individual stalls for each cow and with each of said stalls having a bottom which is also a smooth pavement....'

"(e) '... which is disposed at an elevation above the paved surface forming the floor....'

"(f) '... said stalls being dimensioned so that a cow can comfortably stand or lie in the stall, but offal from the cow falls outside the stall bottom and onto the floor providing the walking surface in the barn....'

"(g) '... said barn further including defined feeding areas having feeding troughs....'

"(h) '... a cow-holding area.'

"(i) '... a milking area.'

"(j) '... a transfer area all bottomed with the walking surface forming said floor in the barn....'

"(k) '... and floor washing means for washing the floor providing the walking surface in the barn where said floor bottom, said feeding, holding, milking and transfer areas operable to send wash water flowing over the floor with such water washing any cow offal thereon into the said drain means, said floor washing means including means located over a region of said floor which is uphill from said drain means constructed to collect water as a pool above said floor and operable after such collection of water as a pool to dispense the water as a sheet of water over said floor.'

"(l) A tank on a mounting, so that it can be tilted, and the water poured out to cascade on the floor to form a sheet.

"(m) A floor-washing means comprising a dam for damming or collecting water as a pool directly on the floor, which such dam abruptly openable to send water cascading as a sheet over the floor towards the drain.

"2. I further find that each of the items above-described were not new, but had been used in the dairy business prior to the time the application for the said Gribble patent, made the subject of this action, had been filed in the Patent Office of the United States on November 5, 1963."

3 The District Court found:

"Many of the items going to make up Plaintiff's claim for a patent were disclosed in prior patents, known respectively as the McCormack patent, the Holz patent, the Ingraham patent, the Kreutzer patent, the Bogert patent, and the Luks patent; and that the statements of the Examiner's opinions refusing to issue a patent are true as to all items there stated to be covered in prior patents or publications."

4 This witness further testified:

"[W]ater has energy and it can be used in many different ways. In a hose the energy is used

by impact, under pressure, external force that is applied to this pressure - to this water, whereas the water that comes down as a sheet or wall of water has built in energy because of its elevation and as this water is released it does the same thing water does in a flooded stream. As this water - I will try to make this clear, and I hope I can, on the surface of this pavement there are these piles of manure droppings. This pavement is smooth and this water moves down over this manure. The water at the bottom has more friction than this water on the top and it keeps moving ahead and as this water keeps moving ahead we get a rolling action of this water which produced the cleaning action. That is the key to this method of cleaning. You do not get this in a hose. You do not get it in a gutter as has been used in the past. I might just mention a little bit about the hose. This squirting water on a floor - probably have done it on our own side-walks or walkways, and I just mention that, that unless that water is continuously directed towards the cleaning area the cleaning action almost ceases instantaneously. Now the movie that was shown earlier very dramatically illustrated that point. The cleaning action - as soon as the hoses moved to one side the cleaning action ceased here and that is why this hose was moved back and forth, to drive this stuff on down to where we want it."

[*278] [***789] The District Court found that "[n]either the tank which holds the water, nor the means of releasing the water quickly is new, but embrace[s] tanks and doors which have long been known," and further that "their use in this connection is one that is obvious, and the patent in that respect is lacking in novelty. The patent does not meet the non-obvious requirements of the law." The District Court therefore held that Dairy Establishment "may be relevant [*1536] to commercial success, but not to invention," because the combination "was reasonably obvious to one with ordinary skill in the art." Moreover, even if the combination filled a "long-felt want and... has enjoyed commercial success, those matters, without invention, will not make patentability." Finally, the District Court concluded: "[T]o those skilled in the art, the use of the old elements in combination was not an invention by the obvious-nonobvious standard. Even [*279] though the dairy barn in question attains the posture of a successful venture, more than that is needed for invention." ⁵ The

Court of Appeals disagreed with the District Court's conclusion on the crucial issue of obviousness.

5 The court also concluded that "while the combination of old elements may have performed a useful function, it added nothing to the nature and quality of dairy barns theretofore used."

***[EdHR2] [2]It has long been clear that the Constitution requires that there be some "invention" to be entitled to patent protection. *Dann v. Johnston*, ante, p. 219. As we explained in *Hotchkiss v. Greenwood*, 11 How. 248, 267 (1851): "[U]nless more ingenuity and skill... were required... than were possessed by an ordinary mechanic acquainted with the business, there was an absence of that degree of skill and ingenuity which constitute essential elements of every invention. In other words, the improvement is the work of the skillful mechanic, not that of the inventor." This standard was enacted in 1952 by Congress in 35 U.S.C. § 103 "as a codification of judicial precedents... with congressional directions that inquiries into the obviousness of the subject matter sought to be patented are a prerequisite to patentability." *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966). Section 103 provides: S

"A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject ***790] matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made."I

[*280] ***[EdHR3] [3]The ultimate test of patent validity is one of law, *Great A. & P. Tea Co. v. Supermarket Corp.*, 340 U.S. 147, 155 (1950), but resolution of the obviousness issue necessarily entails several basic factual inquiries, *Graham v. John Deere Co.*, supra, at 17. S

"Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved." *Ibid.*I

***[EdHR1B] [1B]The Court of Appeals concluded that "the facts presented at trial clearly do not support [the District Court's] finding of obviousness under the three-pronged *Graham* test...." 474 F. 2d, at 172.We disagree and hold that the Court of Appeals erroneously set aside the District Court's findings.

***[EdHR4] [4] ***[EdHR5] [5]The scope of the prior art was shown by prior patents, prior art publications, affidavits of people having knowledge of prior flush systems analogous to respondent's, and the testimony of a dairy operator with 22 years of experience who described flush systems he had seen on visits to dairy farms throughout the country. Our independent examination of that evidence persuades us of its sufficiency to support the District Court's finding "as a fact that each and all of the component parts of this patent... were old and well-known throughout the dairy industry long prior to the date of the filing of the application for the Gribble patent.... What Mr. Gribble referred to... as the essence of the [*1537] patent, to-wit, the manure flush system, was old, various means for flushing manure from dairy barns having been used long before the filing of the application...." 6 Indeed, [*281] respondent admitted at trial "that the patent is made up of a combination of old elements" and "that all elements are individually old...." Accordingly, the District Court properly followed our admonition in *Great A. & P. Tea Co. v. Supermarket Corp.*, supra, at 152: "Courts should scrutinize combination patent claims with a care proportioned to the difficulty and improbability of finding invention in an assembly of old elements...." ***791] A patent for a combination which only unites old elements with no change in their respective functions... obviously withdraws what already is known into the field of its monopoly and diminishes the resources available to skillful men...."

6 The court stated:

"I therefore find as a fact that each and all of the component parts of this patent as listed under the applicant's claims set out in said patent, were old and well-known throughout the dairy industry long prior to the date of the filing of the application for the Gribble patent. I further find that what Mr. Gribble referred to in his deposition as the essence of the patent, to-wit, the manure flush system, was old, various means for flushing manure from dairy barns having been used long

425 U.S. 273, *281; 96 S. Ct. 1532, **1537;
47 L. Ed. 2d 784, ***791; 1976 U.S. LEXIS 146

before the filing of the application for the Gribble patent, the general idea in that connection being a hard surfaced sloping floor onto which the cows' offal was dropped, and some system of introducing water in sufficient quantities and force onto said floor to wash the offal therefrom, with a ditch or drain to carry the offal so washed away from the barn, either into a manure container or otherwise."

The Court of Appeals recognized that the patent combined old elements for applying water to a conventional sloped floor in a dairy barn equipped with drains at the bottom of the slope and that the purpose of the storage tank - to accumulate a large volume of water capable of being released in a cascade or surge - was equally conventional. 474 F. 2d, at 169. It concluded, however, that the element lacking in the prior art was any evidence of an arrangement of the old elements to effect the abrupt release of a flow of water to wash animal wastes from the floor of a dairy barn. *Ibid*. Therefore, [*282] "although the [respondent's] flush system does not embrace a complicated technical improvement, it does achieve a synergistic result through a novel combination." *Id.*, at 173.

[***LEdHRIC] [1C] [***LEdHR6] [6]We cannot agree that the combination of these old elements to produce an abrupt release of water directly on the barn floor from storage tanks or pools can properly be characterized as synergistic, that is, "result[ing] in an effect greater than the sum of the several effects taken separately." *Anderson's-Black Rock v. Pavement Co.*, 396 U.S. 57, 61 (1969). Rather, this patent simply arranges old elements with each performing the same function it had been known to perform, although perhaps producing a more striking result than in previous combinations. Such combinations are not patentable under standards appropriate for a combination patent. *Great A. & P. Tea Co. v. Supermarket Corp.*, *supra*; *Anderson's-Black Rock v. Pavement Co.*, *supra*. Under those authorities this assembly of old elements that delivers water directly rather than through pipes or hoses to the barn floor falls under the head of "the work of the skillful mechanic, not that of the inventor." *Hotchkiss v. Greenwood*, 11 How.,

at 267. Exploitation of the principle of gravity adds nothing to the sum of useful knowledge where there is no change in the respective functions of the elements of the combination; this particular use of the assembly of old elements would be obvious to any person skilled in the art of mechanical application. See *Dann v. Johnston*, *ante*, at 229-230.

[***LEdHRID] [1D] [***LEdHR7] [7]Though doubtless a matter of great convenience, producing a desired result in a cheaper and faster way, and enjoying commercial success, Dairy Establishment "did not produce a 'new or different [*1538] function'... within the test of validity of combination patents." *Anderson's-Black Rock v. Pavement Co.*, *Supra*, at 60. These [*283] desirable benefits "without invention will not make patentability." *Great A. & P. Tea Co. v. Supermarket Corp.*, 340 U.S., at 153. See *Dann v. Johnston*, *ante*, at 230 n. 4.

Reversed.

REFERENCES

60 Am Jur 2d, Patents 53- 86

19 Am Jur Pl & Pr Forms (Rev ed), Patents, Forms 11-22

14 Am Jur Legal Forms 2d, Patents 196:1 et seq.

35 USCS 103

US L Ed Digest, Patents 19.1, 40

ALR Digests, Patents 7, 9

L Ed Index to Annos, Patents

ALR Quick Index, Patents

Federal Quick Index, Patents

Annotation References:

Application and effect of 35 USCS 103, requiring nonobvious subject matter, in determining validity of patents. 23 ALR Fed 326.

LEXSEE 383 U.S. 39

UNITED STATES v. ADAMS ET AL.

No. 55

SUPREME COURT OF THE UNITED STATES

383 U.S. 39; 86 S. Ct. 708; 15 L. Ed. 2d 572; 1966 U.S. LEXIS 2754; 148 U.S.P.Q.
(BNA) 479

October 14, 1965, Argued
February 21, 1966, Decided

PRIOR HISTORY: CERTIORARI TO THE
UNITED STATES COURT OF CLAIMS.

time for filing petition for certiorari --

Headnote:[1]

DISPOSITION: 165 Ct. Cl. 576, 330 F.2d 622,
affirmed.

In a suit against the United States in the Court of Claims for patent infringement and breach of an implied contract to pay compensation for the use of the invention, in which the trial commissioner held that the patent was valid and infringed in part but that no contract had been established, the Court of Claims adopted these findings but initially reached only the patent questions and decided the contract claims on a timely motion to amend the judgment, the 90-day period for filing a petition of certiorari with the Supreme Court begins with the date of decision on the contract issue, since the Government's liability is inextricably linked with the alleged contract action which was not determined until the latter judgment.

SUMMARY:

Persons having an interest in a patent on a nonrechargeable electrical battery using magnesium and cuprous chloride electrodes in a water electrolyte sued the United States in the United States Court of Claims for infringement and breach of an implied contract to pay compensation for use of the invention. The Court of Claims held the patent valid and infringed (165 Ct Cl 576, 330 F2d 622), and about 6 months later, on a motion to amend the judgment, it held that no contract had been established.

[***LEdHN2]

On certiorari to review only the patent-validity issue, the Supreme Court of the United States affirmed. In an opinion by Clark, J., expressing the views of seven members of the Court, it was held that (1) the 90-day period for filing the petition for certiorari began with the date of decision on the contract issue, and (2) the invention was both novel and nonobvious.

ERROR §882(2)

time for filing petition for certiorari --

Headnote:[2A][2B]

White, J., dissented without opinion.

The 90-day period for filing a petition for certiorari with the Supreme Court runs from the date of the order overruling a timely motion to amend the judgment.

[***LEdHN3]

Fortas, J., did not participate.

LAWYERS' EDITION HEADNOTES:

ERROR §963

[***LEdHN1]

certiorari -- service --

ERROR §882(2)

Headnote:[3]

There is no merit in a contention that on a petition for certiorari the United States failed to comply with *Supreme Court Rules 21(1)* and *33* as to service, since the requirement is not jurisdictional, no prejudice resulted, and the failure was inadvertent.

[***LEdHN4]

PATENTS §18

patentability --

Headnote:[4]

Novelty and nonobviousness, as well as utility, are separate tests of patentability and all must be satisfied in a valid patent.

[***LEdHN5]

PATENTS §123

claims -- construction with specifications --

Headnote:[5]

While the claims of a patent limit the invention, and specifications cannot be used to expand the patent monopoly, the claims are to be construed in the light of the specifications, and both are to be read with a view to ascertaining the invention.

[***LEdHN6]

PATENTS §69

novelty -- battery --

Headnote:[6]

A nonrechargeable electrical battery consisting of a magnesium electrode, a cuprous chloride electrode, and an electrolyte of either plain or salt water, is novel where a previous foreign patent claiming magnesium as an electrode specified an acid electrolyte and was both dangerous and inoperable.

[***LEdHN7]

PATENTS §60

novelty -- previous unsuccessful invention --

Headnote:[7]

An inoperable invention or one which fails to achieve its intended result does not negative novelty, even though a foreign patent has been issued on it.

[***LEdHN8]

PATENTS §27

patentability -- equivalence --

Headnote:[8]

There is no equivalency negating the patentability of a nonrechargeable electrical battery using magnesium and cuprous chloride electrodes on the ground that such electrodes were merely equivalent substitutions for zinc and silver chloride electrodes where the operating characteristics were different and therefore nonequivalent and the previous batteries were of a completely different type.

[***LEdHN9]

PATENTS §19.1

nonobviousness -- combining known elements --

Headnote:[9]

A nonrechargeable electrical battery consisting of a magnesium electrode, a cuprous chloride electrode, and an electrolyte of plain or salt water, is nonobvious where its operating characteristics were unexpected and surpassed existing wet batteries, and to combine the elements known to the prior art, a person reasonably skilled in the prior art must ignore that batteries continuing to operate on an open circuit and which heated in normal use were not practical and that water-activated batteries were successful only when combined with electrolytes detrimental to the use of magnesium.

[***LEdHN10]

PATENTS §19.1

nonobviousness -- disadvantages in old devices --

Headnote:[10]

While one who merely finds new uses for old inventions by shutting his eyes to their prior

disadvantages does not thereby discover a patentable innovation, known disadvantages in old devices which would naturally discourage the search for new inventions may be taken into account in determining nonobviousness.

[***LEdHN11]

PATENTS §19.1

obviousness -- factors --

Headnote:[11]

As bearing on the question of the obviousness of an invention, the court may consider that noted experts expressed disbelief in the invention, that several of the same experts subsequently recognized the significance of the invention and some even patented improvements on the same system, that in a crowded art replete with a century and a half of advancement the Patent Office found not one reference to cite against the invention, and that as against the subsequently issued improvement patents, the Patent Office found but three references prior to the invention in question, none of which was relied on against it.

SYLLABUS

Respondents sued the Government under 28 U. S. C. § 1498 charging infringement and breach of contract to compensate for use of a wet battery on which a patent had been issued to respondent Adams. The battery consisted of a magnesium electrode (anode) and a cuprous chloride electrode (cathode) placed in a container with water to be supplied as the electrolyte, providing a constant voltage and current without the use of acids. Despite initial disbelief in the battery's efficacy by government experts to whose attention Adams brought his invention the Government ultimately (but without notifying Adams) put the battery to many uses. In opposition to respondents' suit the Government claimed the device unpatentable because the use of magnesium and cuprous chloride to perform the function shown by Adams had been previously well known in the art and their combination represented no significant change compared to the prior art wet battery designs such as those using a zinc anode and silver chloride cathode for which magnesium and cuprous chloride were known substitutes. The Court of Claims adopted the Trial Commissioner's finding that the patent was valid and

infringed by some of the accused devices. Six months later, following respondents' motion to amend the judgment, that court found no breach of contract. More than 90 days after the initial judgment but less than that period after the contract decision, the Government sought a time extension for review as to the issue of patent validity. Such review was later granted though service on respondents of the petition for writ of certiorari was delayed beyond the time prescribed by this Court's rules. *Held:*

1. The petition for certiorari was timely, since the 90-day filing period commenced, not with the initial judgment, but with the judgment on the contract issue; nor did failure to comply with the Court's rules as to service of the petition bar this review since the service requirements therein are not jurisdictional, and no prejudice resulted from the Government's inadvertent failure to meet those requirements. Pp. 41-42.

2. The Adams patent is valid since it satisfied the separate tests of novelty, nonobviousness, and utility required for issuance of a patent. *Graham v. John Deere Co.*, ante, p. 1. Pp. 48-52.

3. The Adams battery was novel. Pp. 48-51.

(a) The fact that it was water-activated set it apart from the prior art. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, distinguished. Pp. 48-50.

(b) The combination of magnesium and cuprous chloride was novel in the light of the prior art. P. 50.

(c) The use of magnesium for zinc and cuprous chloride for silver chloride did not involve merely equivalent substitutes, as is evidenced by the fact that the Adams battery had different operating characteristics from those of the batteries relied upon by the Government. Pp. 50-51.

4. The Adams battery was nonobvious. Pp. 51-52.

(a) Though each of the battery's elements was well known in the prior art, to combine them as Adams did required that a person reasonably skilled in that art ignore that open-circuit batteries which heated in normal use were not practical and that water-activated batteries were successful only when combined with electrolytes harmful to the use of magnesium. Pp. 51-52.

(b) Noted experts had expressed initial disbelief in the Adams battery. P. 52.

(c) In a crowded art replete with a century and a half of advance the Patent Office could find no reference to cite against the Adams application. P. 52.

COUNSEL: Assistant Attorney General Douglas argued the cause for the United States. With him on the brief were Acting Solicitor General Spritzer, Sherman L. Cohn and Edward Berlin.

John A. Reilly argued the cause and filed a brief for respondents.

JUDGES: Warren, Harlan, Brennan, Black, Stewart, Clark, White, Douglas; Fortas took no part in the consideration or decision of this case.

OPINION BY: CLARK

OPINION

[*40] [***574] [**709] MR. JUSTICE CLARK delivered the opinion of the Court.

This is a companion case to No. 11, *Graham v. John Deere Co.*, decided this day along with Nos. 37 and 43, *Calmar, Inc. v. Cook Chemical Co.* and *Colgate-Palmolive Co. v. Cook Chemical Co.* The United States seeks review of a judgment of the Court of Claims, holding valid and infringed a patent on a wet battery issued to [*41] Adams. This suit under 28 U. S. C. § 1498 (1964 ed.) was brought by Adams and others holding an interest in the patent against the Government charging both infringement and breach of an implied contract to pay compensation for the use of the invention. The Government challenged the validity of the patent, denied that it had been infringed or that any contract for its use had ever existed. The Trial Commissioner held that the patent was valid and infringed in part but that no contract, express or implied, had been established. The Court of Claims adopted these findings, initially reaching only the patent questions, 165 Ct. Cl. 576, 330 F.2d 622, but subsequently, on respondents' motion to amend the judgment, deciding the contract claims as well. 165 Ct. Cl. at 598. The United States sought certiorari on the patent validity issue only. We granted the writ, along with the others, in order to settle the important issues of patentability presented by the four cases. 380 U.S. 949. We affirm.

I.

[***LEdHR1] [1] [***LEdHR2A] [2A] While this case is controlled on the merits by No. 11, *Graham, ante*, p. 1, respondents have raised threshold issues as to our jurisdiction which require separate handling. They say that the petition for certiorari came too late, contending that the 90-day period for filing began with the date of the initial judgment rather than the date of the decision on the contract issue, citing *F. T. C. v. Minneapolis-Honeywell Co.*, 344 U.S. 206 (1952). We cannot agree; first, because that case did not involve a timely motion to amend the judgment¹ and, secondly, because here the Government's liability was inextricably [*42] linked with the alleged contract action which was not determined until the latter judgment.

[***LEdHR2B] [2B]

1 Where a timely motion is filed, the time in such cases runs from the date of the order overruling the motion. See *Department of Banking v. Pink*, 317 U.S. 264, 267 (1942); *United States v. Crescent Amusement Co.*, 323 U.S. 173, 177 (1944); *Forman v. United States*, 361 U.S. 416, 426 (1960).

[***LEdHR3] [3] Nor is there merit in respondents' contention that the Government failed to comply with the requirements of our *Rules 21 (1)* and *33* as to service, since these requirements are not jurisdictional, no [***575] prejudice resulted and the failure was inadvertent.

We turn now to the merits.

II.

The Patent in Issue and Its Background.

The patent under consideration, U.S. No. 2,322,210, was issued in 1943 upon an application filed in December 1941 by Adams. It relates to a nonrechargeable, as opposed to a storage, electrical battery. Stated simply, the battery comprises two electrodes -- one made of magnesium, the other of cuprous chloride -- which are placed in a container. The electrolyte, or battery fluid, used may be either plain or salt water.

The specifications of the patent state that the object of the invention is to provide constant voltage and current

without the use of acids, conventionally employed in storage batteries, and without the generation of dangerous fumes. Another object is "to provide a battery which is relatively light in weight with respect to capacity" and which "may be [*710] manufactured and distributed to the trade in a dry condition and rendered serviceable by merely filling the container with water." Following the specifications, which also set out a specific embodiment of the invention, there appear 11 claims. Of these, principal reliance has been placed upon Claims 1 and 10, which read:

"1. A battery comprising a liquid container, a magnesium electropositive electrode inside the container and having an exterior terminal, a fused cuprous chloride electronegative electrode, and a terminal connected with said electronegative electrode."

["43] "10. In a battery, the combination of a magnesium electropositive electrode, and an electronegative electrode comprising cuprous chloride fused with a carbon catalytic agent."

For several years prior to filing his application for the patent, Adams had worked in his home experimenting on the development of a wet battery. He found that when cuprous chloride and magnesium were used as electrodes in an electrolyte of either plain water or salt water an improved battery resulted.

The Adams invention was the first practical, water-activated, constant potential battery which could be fabricated and stored indefinitely without any fluid in its cells. It was activated within 30 minutes merely by adding water. Once activated, the battery continued to deliver electricity at a voltage which remained essentially constant regardless of the rate at which current was withdrawn. Furthermore, its capacity for generating current was exceptionally large in comparison to its size and weight. The battery was also quite efficient in that substantially its full capacity could be obtained over a wide range of currents. One disadvantage, however, was that once activated the battery could not be shut off; the chemical reactions in the battery continued even though current was not withdrawn. Nevertheless, these chemical reactions were highly exothermic, liberating large quantities of heat during operation. As a result, the battery performed with little effect on its voltage or current in very low temperatures. Relatively high temperatures would not damage the battery. Consequently, the battery was operable from 65 degrees

below zero Fahrenheit to 200 degrees Fahrenheit. See findings at *165 Ct. Cl.*, at 591-592, 330 F.2d, at 632.

["*576] Less than a month after filing for his patent, Adams brought his discovery to the attention of the Army and Navy. Arrangements were quickly made for demonstrations [*44] before the experts of the United States Army Signal Corps. The Signal Corps scientists who observed the demonstrations and who conducted further tests themselves did not believe the battery was workable. Almost a year later, in December 1942, Dr. George Vinal, an eminent government expert with the National Bureau of Standards, still expressed doubts. He felt that Adams was making "unusually large claims" for "high watt hour output per unit weight," and he found "far from convincing" the graphical data submitted by the inventor showing the battery's constant voltage and capacity characteristics. He recommended, "Until the inventor can present more convincing data about the performance of his [battery] cell, I see no reason to consider it further."

However, in November 1943, at the height of World War II, the Signal Corps concluded that the battery was feasible. The Government thereafter entered into contracts with various battery companies for its procurement. The battery was found adaptable to many uses. Indeed, by 1956 it was noted that "there can be no doubt that the addition of water activated batteries to the family of power sources has brought about developments which would otherwise have been technically [*711] or economically impractical." See Tenth Annual Battery Research and Development Conference, Signal Corps Engineering Laboratories, Fort Monmouth, N. J., p. 25 (1956). Also, see Finding No. 24, *165 Ct. Cl.*, at 592, 330 F.2d, at 632.

Surprisingly, the Government did not notify Adams of its changed views nor of the use to which it was putting his device, despite his repeated requests. In 1955, upon examination of a battery produced for the Government by the Burgess Company, he first learned of the Government's action. His request for compensation was denied in 1960, resulting in this suit.

["*45] III.

The Prior Art.

The basic idea of chemical generation of electricity is, of course, quite old. Batteries trace back to the epic

discovery by the Italian scientist Volta in 1795, who found that when two dissimilar metals are placed in an electrically conductive fluid an electromotive force is set up and electricity generated. Essentially, the basic elements of a chemical battery are a pair of electrodes of different electrochemical properties and an electrolyte which is either a liquid (in "wet" batteries) or a moist paste of various substances (in the so-called "dry-cell" batteries). Various materials which may be employed as electrodes, various electrolyte possibilities and many combinations of these elements have been the object of considerable experiment for almost 175 years. See generally, Vinal, *Primary Batteries* (New York 1950).

At trial, the Government introduced in evidence 24 patents and treatises as representing the art as it stood in 1938, the time of the Adams invention.² Here, however, the Government has relied primarily [***577] upon only six of these references³ which we may summarize as follows.

2 The references are listed in the opinion of the Court of Claims, 165 Ct. Cl., at 590, 330 F.2d, at 631.

3 Niaudet, *Elementary Treatise on Electric Batteries* (Fishback translation 1880); Hayes U.S. Patent No. 282,634 (1883); Wood U.S. Patent No. 1,696,873 (1928); Codd, *Practical Primary Cells* (London 1929); Wensky British Patent No. 49 of 1891; and Skrivanoff British Patent No. 4,341 (1880).

The Niaudet treatise describes the Marie Davy cell invented in 1860 and De La Rue's variations on it. The battery comprises a zinc anode and a silver chloride cathode. Although it seems to have been capable of working in an electrolyte of pure water, Niaudet says the battery was of "little interest" until De La Rue used a solution of ammonium chloride as an electrolyte. Niaudet also states that "the capital advantage of this battery, [*46] as in all where zinc with sal ammoniac [ammonium chloride solution] is used, consists in the absence of any local or internal action as long as the electric circuit is open; in other words, this battery does not work upon itself." Hayes likewise discloses the De La Rue zinc-silver chloride cell, but with certain mechanical differences designed to restrict the battery from continuing to act upon itself.

The Wood patent is relied upon by the Government as teaching the substitution of magnesium, as in the

Adams patent, for zinc. Wood's patent, issued in 1928, states: "It would seem that a relatively high voltage primary cell would be obtained by using . . . magnesium as the . . . [positive] electrode and I am aware that attempts have been made to develop such a cell. As far as I am aware, however, these have all been unsuccessful, and it has been generally accepted that magnesium could not be commercially utilized as a primary cell electrode." Wood recognized that the difficulty with magnesium electrodes is their susceptibility to chemical corrosion by the action of acid or ammonium chloride electrolytes. Wood's solution to this problem was to use a [***712] "neutral electrolyte containing a strong soluble oxidizing agent adapted to reduce the rate of corrosion of the magnesium electrode on open circuit." There is no indication of its use with cuprous chloride, nor was there any indication that a magnesium battery could be water-activated.

The Codd treatise is also cited as authority for the substitution of magnesium. However, Codd simply lists magnesium in an electromotive series table, a tabulation of electrochemical substances in descending order of their relative electropositivity. He also refers to magnesium in an example designed to show that various substances are more electropositive than others, but the discussion involves a cell containing an acid which would destroy magnesium within minutes. In short, Codd indicates, by inference, only that magnesium is a theoretically [*47] desirable electrode by virtue of its highly electropositive character. He does not teach that magnesium could be combined in a water-activated battery or that a battery using magnesium would have the properties of the Adams device. Nor does he suggest, as the Government indicates, that cuprous chloride could be substituted for silver chloride. He merely refers to the cuprous *ion* -- a generic term which includes an infinite number of copper compounds -- and in no way suggests that cuprous chloride could be employed in a battery.

[***578] The Government then cites the Wensky patent which was issued in Great Britain in 1891. The patent relates to the use of cuprous chloride as a depolarizing agent. The specifications of his patent disclose a battery comprising zinc and copper electrodes, the cuprous chloride being added as a salt in an electrolyte solution containing zinc chloride as well. While Wensky recognized that cuprous chloride could be used in a constant-current cell, there is no indication that he taught a water-activated system or that magnesium

383 U.S. 39, *47; 86 S. Ct. 708, **712;
15 L. Ed. 2d 572, ***578; 1966 U.S. LEXIS 2754

could be incorporated in his battery.

Finally, the Skrivanoff patent depended upon by the Government relates to a battery designed to give intermittent, as opposed to continuous, service. While the patent claims magnesium as an electrode, it specifies that the electrolyte to be used in conjunction with it must be a solution of "alcoline, chloro-chromate, or a permanganate strengthened with sulphuric acid." The cathode was a copper or carbon electrode faced with a paste of "phosphoric acid, amorphous phosphorous, metallic copper in spangles, and cuprous chloride." This paste is to be mixed with hot sulfuric acid before applying to the electrode. The Government's expert testified in trial that he had no information as to whether the cathode, as placed in the battery, would, after having been mixed with the other chemicals prescribed, actually [*48] contain cuprous chloride. Furthermore, respondents' expert testified, without contradiction, that he had attempted to assemble a battery made in accordance with Skrivanoff's teachings, but was met first with a fire when he sought to make the cathode, and then with an explosion when he attempted to assemble the complete battery.

IV.

The Validity of the Patent.

***[LEdHR4] [4]The Government challenges the validity of the Adams patent on grounds of lack of novelty under 35 U. S. C. § 102 (a) (1964 ed.) as well as obviousness under 35 U. S. C. § 103 (1964 ed.). As we have seen in *Graham v. John Deere Co.*, ante, p. 1, novelty and nonobviousness -- as well as utility -- are separate tests of patentability and all must be satisfied in a valid patent.

The Government concludes that wet batteries comprising a zinc anode and silver chloride cathode are old in the art; and that the prior art shows that magnesium may be substituted for zinc and cuprous chloride for silver chloride. [*713] Hence, it argues that the "combination of magnesium and cuprous chloride in the Adams battery was not patentable because it represented either no change or an insignificant change as compared to prior battery designs." And, despite "the fact that, wholly unexpectedly, the battery showed certain valuable operating advantages over other batteries [these advantages] would certainly not justify a patent on the essentially old formula."

***[LEdHR5] [5]There are several basic errors in the Government's position. First, the fact that the Adams battery is water-activated sets his device apart from the prior art. It is true that Claims 1 and 10, *supra*, do not mention a water electrolyte, but, as we have noted, a stated object of the invention was to provide a battery rendered serviceable by the mere addition of water. While the claims of a [*49] patent limit the invention, and specifications cannot be utilized to expand the patent monopoly, *Burns v. Meyer*, 100 U.S. 671, 672 (1880); *McCarty v. Lehigh Valley R. Co.*, 160 U.S. 110, 116 [*579] (1895), it is fundamental that claims are to be construed in the light of the specifications and both are to be read with a view to ascertaining the invention, *Seymour v. Osborne*, 11 Wall. 516, 547 (1871); *Schriber-Schroth Co. v. Cleveland Trust Co.*, 311 U.S. 211 (1940); *Schering Corp. v. Gilbert*, 153 F.2d 428 (1946). Taken together with the stated object of disclosing a water-activated cell, the lack of reference to any electrolyte in Claims 1 and 10 indicates that water alone could be used. Furthermore, of the 11 claims in issue, three of the narrower ones include references to specific electrolyte solutions comprising water and certain salts. The obvious implication from the absence of any mention of an electrolyte -- a necessary element in any battery -- in the other eight claims reinforces this conclusion. It is evident that respondents' present reliance upon this feature was not the afterthought of an astute patent trial lawyer. In his first contact with the Government less than a month after the patent application was filed, Adams pointed out that "no acids, alkalies or any other liquid other than plain water is used in this cell. Water does not have to be distilled. . . ." Letter to Charles F. Kettering (January 7, 1942), R., pp. 415, 416. Also see his letter to the Department of Commerce (March 28, 1942), R., p. 422. The findings, approved and adopted by the Court of Claims, also fully support this conclusion.

Nor is *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327 (1945), apposite here. There the patentee had developed a rapidly drying printing ink. All that was needed to produce such an ink was a solvent which evaporated quickly upon heating. Knowing that the boiling point of a solvent is an indication of its rate of [*50] evaporation, the patentee merely made selections from a list of solvents and their boiling points. This was no more than "selecting the last piece to put into the last opening in a jig-saw puzzle." 325 U.S., at 335. Indeed, the Government's reliance upon *Sinclair & Carroll* points

up the fallacy of the underlying premise of its case. The solvent in *Sinclair & Carroll* had no functional relation to the printing ink involved. It served only as an inert carrier. The choice of solvent was dictated by known, required properties. Here, however, the Adams battery is shown to embrace elements having an interdependent functional relationship. It begs the question, and overlooks the holding of the Commissioner and the Court of Claims, to state merely that magnesium and cuprous chloride were individually known battery components. If such a combination is novel, the issue is whether bringing them together as taught by Adams was obvious in the light of the prior art.

[**714] [***LEdHR6] [6] [***LEdHR7] [7]We believe that the Court of Claims was correct in concluding that the Adams battery is novel. Skrivanoff disclosed the use of magnesium in an electrolyte completely different from that used in Adams. As we have mentioned, it is even open to doubt whether cuprous chloride was a functional element in Skrivanoff. In view of the unchallenged testimony that the Skrivanoff formulation was both dangerous and inoperable, it seems anomalous to suggest that it is an anticipation of Adams. An inoperable invention or one which fails to achieve its intended [***580] result does not negative novelty. *Smith v. Snow*, 294 U.S. 1, 17 (1935). That in 1880 Skrivanoff may have been able to convince a foreign patent examiner to issue a patent on his device has little significance in the light of the foregoing.

[***LEdHR8] [8] Nor is the Government's contention that the electrodes of Adams were mere substitutions of pre-existing battery designs supported by the prior art. If the use of magnesium [*51] for zinc and cuprous chloride for silver chloride were merely equivalent substitutions, it would follow that the resulting device -- Adams' -- would have equivalent operating characteristics. But it does not. The court below found, and the Government apparently admits, that the Adams battery "wholly unexpectedly" has shown "certain valuable operating advantages over other batteries" while those from which it is claimed to have been copied were long ago discarded. Moreover, most of the batteries relied upon by the Government were of a completely different type designed to give intermittent power and characterized by an absence of internal action when not in use. Some provided current at voltages which declined fairly proportionately with time.⁴ Others were so-called standard cells which, though producing a constant

voltage, were of use principally for calibration or measurement purposes. Such cells cannot be used as sources of power.⁵ For these reasons we find no equivalency.⁶

4 It is interesting to note in this connection that in testing the Adams cell the Signal Corps compared it with batteries of this type. The graphical results of the comparison are shown in respondents' brief, p. 51.

5 The standard text in the art states: "The best answer to the oft-repeated question: 'How much current can I draw from my standard cell?' is 'None.'" Vinal, Primary Batteries, p. 212 (New York 1950); see also Ruben U.S. Patent No. 1,920,151 (1933).

6 In their motion to dismiss the writ of certiorari as improvidently granted, respondents asserted that the Government was estopped to claim equivalency of cuprous chloride and silver chloride. We find no merit in this contention and, therefore, deny the motion.

[***LEdHR9] [9] [***LEdHR10] [10]We conclude the Adams battery was also nonobvious. As we have seen, the operating characteristics of the Adams battery have been shown to have been unexpected and to have far surpassed then-existing wet batteries. Despite the fact that each of the elements of the Adams battery was well known in the prior art, to combine [*52] them as did Adams required that a person reasonably skilled in the prior art must ignore that (1) batteries which continued to operate on an open circuit and which heated in normal use were not practical; and (2) water-activated batteries were successful only when combined with electrolytes detrimental to the use of magnesium. These long-accepted factors, when taken together, would, we believe, deter any investigation into such a combination as is used by Adams. This is not to say that one who merely finds new uses for old inventions by shutting his eyes to their prior disadvantages thereby discovers a patentable innovation. We do say, however, that known disadvantages in old devices which would [**715] naturally discourage the search for new inventions may be taken into account in determining obviousness.

[***LEdHR11] [11]Nor are these the only factors bearing on the question of obviousness. We have seen that at the time Adams perfected his invention noted experts expressed disbelief in it. Several of the same

experts subsequently [***581] recognized the significance of the Adams invention, some even patenting improvements on the same system. Fischbach et al., U.S. Patent No. 2,636,060 (1953). Furthermore, in a crowded art replete with a century and a half of advancement, the Patent Office found not one reference to cite against the Adams application. Against the subsequently issued improvement patents to Fischbach, *supra*, and to Chubb, U.S. Reissue Patent No. 23,883 (1954), it found but three references prior to Adams -- none of which are relied upon by the Government.

We conclude that the Adams patent is valid. The judgment of the Court of Claims is affirmed.

It is so ordered.

MR. JUSTICE WHITE dissents.

MR. JUSTICE FORTAS took no part in the consideration or decision of this case.

REFERENCES

Annotation References:

Amendment of judgment as affecting time for taking or prosecuting appellate review proceedings. 97 L ed 255; 21 ALR 2d 285.

Computation of time for seeking review in United States Supreme Court. 87 L ed 257.

RELATED PROCEEDINGS APPENDIX

[NONE]